SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies steel doors, steel frames and related components.

B. Terms relating to steel doors and frames as defined in ANSI A123.1 and as specified.

1.2 RELATED WORK

A. Section 01 81 13, SUSTAINABLE DESIGN REQUIREMENTS for additional LEED requirements.

B. Section 01 81 19, INDOOR AIR QUALITY REQUIREMENTS for VOC limit.

C. Frames fabricated of structural steel: Section 05 50 00, METAL FABRICATIONS.

D. Aluminum frames entrance work: Section 08 41 13, ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS.

E. Overhead doors including loading docks: Section 08 33 00, COILING DOORS AND GRILLES.

F. Door Hardware: Section 08 71 00, DOOR HARDWARE.

G. Glazing and ballistic rated glazing: Section 08 80 00, GLAZING.

H. Work by Government:

1. Card readers and biometric devices.
2. Intrusion Alarm.
3. Security Monitors.

1.3 TESTING

A. An independent testing laboratory shall perform testing.

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturers Literature and Data:

1. Fire rated doors and frames, showing conformance with NFPA 80 and Underwriters Laboratory, Inc., or Intertek Testing Services or Factory Mutual fire rating requirements and temperature rise rating for stairwell doors. Submit proof of temperature rating.
2. Sound rated doors, including test report from Testing Laboratory.

C. LEED Submittals:

1. Credits MR 4.1 & 4.2: For products having recycled content, documentation indicating percentages by weight of post-consumer and pre-consumer recycled content.
   a. Include statement indicating costs for each product containing recycled content.
2. Credits MR 5.1 & 5.2: For products manufactured within 500 miles of project site *and* whose raw materials are extracted, harvested or recovered, within 500 miles of the project site, documentation indicating the location and distance of material manufacturer and point of extraction, harvest, or recovery for each raw material from the Project site.
   a. Include statement indicating cost for each regional material and the fraction by weight that is considered regional

1.5 SHIPMENT

A. Prior to shipment label each door and frame to show location, size, door swing and other pertinent information.

B. Fasten temporary steel spreaders across the bottom of each door frame.

1.6 STORAGE AND HANDLING

A. Store doors and frames at the site under cover.

B. Protect from rust and damage during storage and erection until completion.

1.7 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.

B. Federal Specifications (Fed. Spec.):

L-S-125B.....Screening, Insect, Nonmetallic

C. Door and Hardware Institute (DHI):

A115 Series.....Steel Door and Frame Preparation for Hardware, Series A115.1 through A115.17 (Dates Vary)

D. Steel Door Institute (SDI):

113-01.....Thermal Transmittance of Steel Door and Frame Assemblies

128-1997.....Acoustical Performance for Steel Door and Frame Assemblies

A250.8-03.....Standard Steel Doors and Frames

E. American Society for Testing and Materials (ASTM):

A167-99(R2004).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip

A568/568-M-07.....Steel, Sheet, Carbon, and High-Strength, Low-alloy, Hot-Rolled and Cold-Rolled

A1008-08.....Steel, sheet, Cold-Rolled, Carbon, Structural, High Strength Low Alloy and High Strength Low Alloy with Improved Formability

B209/209M-07.....Aluminum and Aluminum-Alloy Sheet and Plate

B221/221M-08.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes

D1621-04.....Compressive Properties of Rigid Cellular Plastics

D3656-07.....Insect Screening and Louver Cloth Woven from Vinyl Coated Glass Yarns

E90-04.....Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions

F. The National Association Architectural Metal Manufactures (NAAMM):
Metal Finishes Manual (1988 Edition)

G. National Fire Protection Association (NFPA):
80-09.....Fire Doors and Fire Windows

H. Underwriters Laboratories, Inc. (UL):
Fire Resistance Directory

I. Intertek Testing Services (ITS):
Certifications Listings…Latest Edition

J. Factory Mutual System (FM):
Approval Guide

PART 2 - PRODUCTS

2.1 MATERIALS

A. Recycled Content of Steel Products: Provide steel products with minimum 25% post-consumer recycled content.

B. Stainless Steel: ASTM A167, Type 302 or 304; finish, NAAMM Number 4.

C. Sheet Steel: ASTM A1008, cold-rolled for panels (face sheets) of doors.

D. Anchors, Fastenings and Accessories: Fastenings anchors, clips connecting members and sleeves from zinc coated steel.

E. Aluminum Sheet: ASTM B209/209M.

F. Aluminum, Extruded: ASTM B221/221M.

G. Prime Paint: Paint that meets or exceeds the requirements of A250.8.

2.2 FABRICATION GENERAL

A. GENERAL:

1. Follow SDI A250.8 for fabrication of standard steel doors, except as specified otherwise. Doors to receive hardware specified in Section 08 71 00, DOOR HARDWARE. Tolerances as per SDI A250.8. Thickness, 44 mm (1-3/4 inches), unless otherwise shown.
2. Close top edge of exterior doors flush and seal to prevent water intrusion.
3. When vertical steel stiffeners are used for core construction, fill spaces between stiffeners with mineral fiber insulation.

B. Standard Duty Doors: SDI A250.8, Level 1, Model 2 of size and design shown. Use for interior locations only. Do not use for stairwell doors, security doors.

C. Heavy Duty Doors: SDI A250.8, Level 2, Model 2 of size and design shown. Core construction types a, d, or f, for interior doors, and, types b, c, e, or f, for exterior doors.

D. Fire Rated Doors (Labeled):

1. Conform to NFPA 80 when tested by Underwriters Laboratories, Inc., Inchcape Testing Services, or Factory Mutual for the class of door or door opening shown.
2. Fire rated labels of metal, with raised or incised markings of approving laboratory shall be permanently attached to doors.
3. Close top and vertical edges of doors flush. Vertical edges shall be seamless. Apply steel astragal to the meeting stile of the active leaf of pairs of fire rated doors, except where vertical rod exit devices are specified for both leaves swinging in the same direction.
4. Construct fire rated doors in stairwell enclosures for maximum transmitted temperature rise of 230 °C (450 °F) above ambient temperature at end of 30 minutes of fire exposure when tested in accordance with ASTM E152.

E. Custom Metal Hollow Doors:

1. Provide custom hollow metal doors where nonstandard steel doors are indicated. At the Contractor’s option, custom hollow metal doors may be provided in lieu of standard steel doors. Door size(s), design, materials, construction, gages and finish shall be as specified for of standard steel doors.

2.3 METAL FRAMES

A. General:
   1. SDI A250.8, 1.3 mm (0.053 inch) thick sheet steel, types and styles as shown or scheduled.
   2. Frames for exterior doors: Fabricate from 1.7 mm (0.067 inch) thick galvanized steel conforming to ASTM A525.
   3. Frames for labeled fire rated doors and windows.
      a. Comply with NFPA 80. Test by Underwriters Laboratories, Inc., Inchcape Testing Services, or Factory Mutual.
      b. Fire rated labels of approving laboratory permanently attached to frames as evidence of conformance with these requirements. Provide labels of metal or engraved stamp, with raised or incised markings.
   4. Frames for doors specified to have automatic door operators; Security doors (Type 36); service window: minimum 1.7 mm (0.067 inch) thick.
   5. Knocked-down frames are not acceptable.

B. Reinforcement and Covers:
   1. SDI A250.8 for, minimum thickness of steel reinforcement welded to back of frames.
   2. Provide mortar guards securely fastened to back of hardware reinforcements except on lead-lined frames.

C. Terminated Stops: SDI A250.8.

D. Glazed Openings:
   1 Integral stop on exterior, corridor, or secure side of door.
   2. Design rabbet width and depth to receive glazing material or panel shown or specified.

E. Frame Anchors:
   1. Floor anchors:
      a. Where floor fills occur, provide extension type floor anchors to compensate for depth of fill.
      b. At bottom of jamb use 1.3 mm (0.053 inch) thick steel clip angles welded to jamb and drilled to receive two 6 mm (1/4 inch) floor bolts.
      c. Where mullions occur, provide 2.3 mm (0.093 inch) thick steel channel anchors, drilled for two 6 mm (1/4 inch) floor bolts and frame anchor screws.

d. Where sill sections occur, provide continuous 1 mm (0.042 inch) thick steel rough bucks drilled for 6 mm (1/4 inch) floor bolts and frame anchor screws. Space floor bolts at 50 mm (24 inches) on center.

2. Jamb anchors:

a. Locate anchors on jambs near top and bottom of each frame, and at intermediate points not over 600 mm (24 inches) apart, except for fire rated frames space anchors as required by labeling authority.

b. Form jamb anchors of not less than 1 mm (0.042 inch) thick steel unless otherwise specified.

c. Anchors set in masonry: Use adjustable anchors designed for friction fit against the frame and for extension into the masonry not less than 250 mm (10 inches). Use one of following type:

1) Wire loop type of 5 mm (3/16 inch) diameter wire.

2) T-shape or strap and stirrup type of corrugated or perforated sheet steel.

d. Anchors for stud partitions: Either weld to frame or use lock-in snap-in type. Provide tabs for securing anchor to the sides of the studs.

e. Modify frame anchors to fit special frame and wall construction and provide special anchors where shown or required.

2.4 SHOP PAINTING

A. SDI A250.8.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Plumb, align and brace frames securely until permanent anchors are set.

1. Use triangular bracing near each corner on both sides of frames with temporary wood spreaders at midpoint.

2. Use wood spreaders at bottom of frame if the shipping spreader is removed.

3. Protect frame from accidental abuse.

4. Where construction will permit concealment, leave the shipping spreaders in place after installation, otherwise remove the spreaders after the frames are set and anchored.

5. Remove wood spreaders and braces only after the walls are built and jamb anchors are secured.

B. Floor Anchors:

1. Anchor the bottom of door frames to floor with two 6 mm (1/4 inch) diameter expansion bolts. Use 9 mm (3/8 inch) bolts on lead lined frames.
2. Power actuated drive pins may be used to secure frame anchors to concrete floors.

C. Jamb Anchors:

1. Anchors in masonry walls: Embed anchors in mortar. Fill space between frame and masonry wall with grout or mortar as walls are built.
2. Coat frame back with a bituminous coating prior to lining of grout filling in masonry walls.
3. Secure anchors to sides of studs with two fasteners through anchor tabs. Use steel drill screws to steel studs.
4. Frames set in prepared openings of masonry or concrete: Expansion bolt to wall with 6 mm (1/4 inch) expansion bolts through spacers. Where subframes or rough bucks are used, 6 mm (1/4 inch) expansion bolts on 600 mm (24 inch) centers or power activated drive pins 600 mm (24 inches) on centers. Secure two piece frames to subframe or rough buck with machine screws on both faces.

D. Install anchors for labeled fire rated doors to provide rating as required.

3.2 INSTALLATION OF DOORS AND APPLICATION OF HARDWARE

A. Install doors and hardware as specified in Section 08 11 13, HOLLOW METAL DOORS AND FRAMES; Section 08 14 00, WOOD DOORS; and Section 08 71 00, DOOR HARDWARE.

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SECTION 08 12 16

ALUMINUM FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes interior aluminum frames for [**doors**] [**and**] [**glazing**] installed in gypsum board partitions.

B. Related Sections:

1. Section 01 81 13, SUSTAINABLE DESIGN REQUIREMENTS for additional LEED requirements.
2. Section 01 81 19, INDOOR AIR QUALITY REQUIREMENTS for VOC limit.
3. Division 08 Section FLUSH WOOD DOORS installed in interior aluminum frames.
4. Division 08 Section ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS for aluminum-framed glass doors installed in interior aluminum frames.
5. Division 26 Sections for electrical connections including conduit and wiring for door controls and operators.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles and finishes.

B. Shop Drawings: Include the following:

1. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
2. Locations of reinforcements and preparations for hardware.
3. Details of each different wall-opening condition.
4. Details of anchorages, joints, field splices, and connections.
5. Details of accessories.
6. Details of moldings, removable stops, and glazing.
7. Details of conduits and preparations for power, signal, and control systems.

C. Samples for Initial Selection: For units with factory-applied finishes.

1. Include similar Samples of seals, gaskets, and accessories involving color selection.

D. Samples for Verification: For interior aluminum frames, prepared on Samples of size indicated below:
   1. Framing Member: 12 inches (300 mm) long.
   2. Corner Fabrication: 12-by-12-inch- (300-by-300-mm-) long, full-size window corner, including full-size sections of extrusions with factory-applied color finish.

E. Schedule: For interior aluminum frames. Use same designations indicated on Drawings. Coordinate with door hardware schedule and glazing.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of interior aluminum frame.

G. Maintenance Data: For interior aluminum frames to include in maintenance manuals.

H. LEED Submittals:
   1. Credits MR 5.1 & 5.2: For products manufactured within 500 miles of project site *and* whose raw materials are extracted, harvested or recovered, within 500 miles of the project site, documentation indicating the location and distance of material manufacturer and point of extraction, harvest, or recovery for each raw material from the Project site.
      a. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain interior aluminum frames from single source from single manufacturer.

B. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
   1. Build mockup of typical wall area as shown on Drawings.
   2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

C. Preinstallation Conference: Conduct conference at Project site.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver interior aluminum frames palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic. Store interior aluminum frames under cover at Project site.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Frameworks Manufacturing.
2. Wilson Partitions.

2.2 COMPONENTS

A. Aluminum Framing: ASTM B 221 (ASTM B 221M), Alloy 6063-T5 or alloy and temper required to suit structural and finish requirements, not less than 0.062 inch (1.6 mm) thick.

B. Door Frames: Extruded aluminum, reinforced for hinges, strikes, and closers.

1. 90-Minute Fire-Protection Rating: Fabricate aluminum frame assemblies with a cold-formed, primed, interior steel liner.

C. Glazing Frames: Extruded aluminum, for glazing thickness indicated.

D. Ceiling Tracks: Extruded aluminum.

E. Trim: Extruded aluminum, not less than 0.062 inch (1.6 mm) thick, with removable snap-in casing trim, glazing stops and door stops without exposed fasteners.

1. Trim Style: Flush.

2.3 ACCESSORIES

A. Fasteners: Aluminum, nonmagnetic, stainless-steel or other noncorrosive metal fasteners compatible with frames, stops, panels, reinforcement plates, hardware, anchors, and other items being fastened.

B. Door Silencers: Manufacturer's standard continuous wool pile. Refer to Section 09 06 00, SCHEDULE OF FINISHES.

C. Glazing Gaskets: Manufacturer's standard extruded or molded plastic, to accommodate glazing thickness indicated. Refer to Section 09 06 00, SCHEDULE OF FINISHES.

D. Glazing: Comply with requirements in Section 08 80 00, GLAZING.

E. Hardware: Comply with requirements in Section 08 71 00, DOOR HARDWARE.

2.4 FABRICATION

A. Provide concealed corner reinforcements and alignment clips for accurately fitted hairline joints at butted or mitered connections.

B. Factory prepare interior aluminum frames to receive templated mortised hardware; include cutouts, reinforcements, mortising, drilling, and

tapping, according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section DOOR HARDWARE.

C. Fabricate frames for glazing with removable stops to allow glazing replacement without dismantling frame.
   1. Locate removable stops on the inside of spaces accessed by keyed doors.

D. Fabricate components to allow secure installation without exposed fasteners.

2.5 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls, floors, and ceilings, with Installer present, for conditions affecting performance of the Work.

B. Verify that wall thickness does not exceed standard tolerances allowed by throat size indicated.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install interior aluminum frames plumb, rigid, properly aligned, and securely fastened in place; comply with manufacturer's written instructions.

B. Set frames accurately in position and plumbed, aligned, and securely anchored to substrates.

C. Install frame components in the longest possible lengths; components up to 96 inches (2450 mm) long must be one piece.
   1. Fasten to suspended ceiling grid on maximum 48-inch (1220-mm) centers, using sheet metal screws or other fasteners approved by frame manufacturer.

2. Use concealed installation clips to produce tightly fitted and aligned splices and connections.
3. Secure clips to extruded main-frame components and not to snap-in or trim members.
4. Do not leave screws or other fasteners exposed to view when installation is complete.

3.3 CLEANING

A. Clean exposed frame surfaces promptly after installation, using cleaning methods recommended by frame manufacturer and according to AAMA 609 & 610.

B. Touch up marred frame surfaces so touchup is not visible from a distance of 48 inches (1220 mm). Remove and replace frames with damaged finish that cannot be satisfactorily repaired.

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SECTION 08 14 00
INTERIOR WOOD DOORS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies interior flush doors with prefinish, prefit option.

B. Section includes fire rated doors and sound retardant doors.

1.2 RELATED WORK

A. Section 01 81 13, SUSTAINABLE DESIGN REQUIREMENTS for additional LEED requirements.

B. Section 01 81 19, INDOOR AIR QUALITY REQUIREMENTS for VOC limit.

C. Metal door frames: Section 08 11 13, HOLLOW METAL DOORS AND FRAMES.

D. Door hardware including hardware location (height): Section 08 71 00, DOOR HARDWARE.

E. Installation of doors and hardware: Section 08 11 13, HOLLOW METAL DOORS AND FRAMES, and Section 08 71 00, DOOR HARDWARE.

F. Glazing: Section 08 80 00, GLAZING.

G. Finish: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 QUALITY ASSURANCE

A. Forest Certification for Wood: Provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship." Companies that take legal ownership of FSC products and produce, sell, promote, or trade them must also be certified for chain of custody.

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Samples:

1. Veneer sample 200 mm (8 inch) by 275 mm (11 inch) by 6 mm (1/4 inch) showing specified wood species sanded to receive a transparent finish. Factory finish veneer sample where the prefinished option is accepted.

C. Shop Drawings:

1. Show every door in project and schedule location in building.
2. Indicate type, grade, finish and size; include detail of glazing, sound gasketing and pertinent details.

3. Provide information concerning specific requirements not included in the manufacturer's literature and data submittal.

D. Manufacturer's Literature and Data:
   1. Labeled fire rated doors showing conformance with NFPA 80.

E. Laboratory Test Reports:
   1. Screw holding capacity test report in accordance with WDMA T.M.10.
   2. Split resistance test report in accordance with WDMA T.M.5.
   3. Cycle/Slam test report in accordance with WDMA T.M.7.
   4. Hinge-Loading test report in accordance with WDMA T.M.8.

F. VOC content for Adhesives, Paints and Coatings: Manufacturers' product data for installation adhesives, paints and coatings applied onsite and inside the weatherproofing system, including printed statement of VOC content (in g/L).

G. Leed Submittals:
   1. Credits MR 4.1 & 4.2: For products having recycled content, documentation indicating percentages by weight of post-consumer and pre-consumer recycled content.
      a. Include statement indicating costs for each product containing recycled content.
   2. Credit MR 7: Certificates of chain of custody signed by manufacturers certifying that products specified to be made of certified wood were made from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, “Principles and Criteria.” Include evidence that mill is certified for chain-of-custody by an FSC-accredited certification body.
      a. Include statement indicating costs for each wood based product.
   3. Credit EQ 4.4:
      a. Composite wood manufacturer’s product data for each composite wood product used indicating that the bonding agent contains no urea formaldehyde.
      b. Adhesive manufacturer’s product data for each adhesive used indicating that the adhesive contains no urea formaldehyde

1.5 WARRANTY

A. Doors are subject to terms of Article titled “Warranty of Construction”, FAR clause 52.246-21, except that warranty shall be as follows:
   1. For interior doors, manufacturer’s warranty for lifetime of original installation.

2. Specified STC RATING for sound retardant rated door assembly in place.

1.6 DELIVERY AND STORAGE

A. Factory seal doors and accessories in minimum of 6 mill polyethylene bags or cardboard packages which shall remain unbroken during delivery and storage.

B. Store in accordance with WDMA I.S.1-A, J-1 Job Site Information.

C. Label package for door opening where used.

1.7 APPLICABLE PUBLICATIONS

Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.

B. Window and Door Manufacturers Association (WDMA):

I.S.1-A-04	Architectural Wood Flush Doors
I.S.4-07A	Water-Repellent Preservative Non-Pressure Treatment for Millwork
I.S.6A-01	Architectural Wood Stile and Rail Doors
T.M.5-90	Split Resistance Test Method
T.M.6-08	Adhesive (Glue Bond) Durability Test Method
T.M.7-08	Cycle-Slam Test Method
T.M.8-08	Hinge Loading Test Method
T.M.10-08	Screwholding Test Method

C. National Fire Protection Association (NFPA):

80-07 Protection of Buildings from Exterior Fire

252-08	Fire Tests of Door Assemblies

D. ASTM International (ASTM):

E90-04	Laboratory Measurements of Airborne Sound Transmission Loss

PART 2 - PRODUCTS

2.1 FLUSH DOORS

A. LEED Requirements:

1. Recycled Content of Steel Products: Provide steel products with minimum 25% post-consumer recycled content.
2. Provide a minimum of 50 percent (by cost) of wood-based materials that are produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

3. Do not use composite wood or agrifiber products or adhesives that contain urea-formaldehyde resin.

A. General:
   1. Meet requirements of WDMA I.S.1-A, Extra Heavy Duty.
   2. Adhesive: Type II.
   3. Thickness: 45 mm (1-3/4 inches) unless otherwise shown or specified.

B. Face Veneer:
   1. In accordance with WDMA I.S.1-A.
   2. For transparent finishes: Premium Grade, rotary cut, maple as indicated in Section 09 06 00, SCHEDULE OF FINISHES and throughout the project unless scheduled or otherwise indicated on Drawings.
      a. AA grade face veneer.
      b. Match face veneers for doors for uniform effect of color and grain at joints.
      c. Door edges shall be same species as door face veneer.
   3. Factory sand doors for finishing.

C. Wood for stops, muntins and moldings of flush doors required to have transparent finish:
   1. Solid Wood of same species as face veneer.
   2. Glazing:
      a. On non-labeled doors use applied wood stops nailed tight on room side and attached on opposite side with flathead, countersunk wood screws, spaced approximately 125 mm (5 inches) on centers.

D. Fire rated wood doors:
   1. Fire Performance Rating:
      a. “B” label, 1-1/2 hours.
      b. “C” label, 3/4 hour.
   2. Labels:
      a. Doors shall conform to the requirements of ASTM E2074, or NFPA 252, and, carry an identifying label from a qualified testing and inspection agency for class of door or opening shown designating fire performance rating.
      b. Metal labels with raised or incised markings.
   3. Performance Criteria for Stiles of doors utilizing standard mortise leaf hinges:
      a. Hinge Loading: WDMA T.M.8. Average of 10 test samples for Extra Heavy Duty doors.

b. Direct screw withdrawal: WDMA T.M.10 for Extra Heavy Duty doors. Average of 10 test samples using a steel, fully threaded #12 wood screw.

c. Cycle Slam: 1,000,000 cycles with no loose hinge screws or other visible signs of failure when tested in accordance with WDMA T.M.7.

4. Additional Hardware Reinforcement:

a. Provide fire rated doors with hardware reinforcement blocking.

b. Size of lock blocks as required to secure hardware specified.

c. Top, bottom and intermediate rail blocks shall measure not less than 125 mm (five inches) minimum by full core width.

d. Reinforcement blocking in compliance with manufacturer's labeling requirements.

e. Mineral material similar to core is not acceptable.

5. Other Core Components: Manufacturer's standard as allowed by the labeling requirements.

6. Provide steel frame approved for use in labeled doors for vision panels.

7. Provide steel astragal on pair of doors.

2.2 PREFINISH AND PREFIT

A. Flush doors shall be factory machined to receive hardware, bevels, undercuts, cutouts, accessories and fitting for frame.

B. Factory fitting to conform to specification for shop and field fitting, including factory application of sealer to edge and routings.

C. Flush doors to receive transparent finish (in addition to being prefit) shall be factory finished as follows:

1. WDMA I.S.1-A Section F-3 specification for System TR-4, Conversion Varnish or System TR-5, Catalyzed Vinyl.

2.3 IDENTIFICATION MARK:

A. On top edge of door.

B. Either a stamp, brand or other indelible mark, giving manufacturer’s name, door’s trade name, construction of door, code date of manufacture and quality.

C. Accompanied by either of the following additional requirements:

1. An identification mark or a separate certification including name of inspection organization.

2. Identification of standards for door, including glue type.

3. Identification of veneer and quality certification.

4. Identification of preservative treatment for stile and rail doors.

2.4 SEALING:

A. Give top and bottom edge of doors two coats of catalyzed polyurethane or water resistant sealer before sealing in shipping containers.

PART 3 - EXECUTION

3.1 DOOR PREPARATION

A. Field, shop or factory preparation: Do not violate the qualified testing and inspection agency label requirements for fire rated doors.

B. Clearances between Doors and Frames and Floors:

1. Maximum 3 mm (1/8 inch) clearance at the jambs, heads, and meeting stiles, and a 19 mm (3/4 inch) clearance at bottom, except as otherwise specified.
2. Maximum clearance at bottom of doors designated to be fitted with mechanical seal: 10 mm (3/8 inch).

C. Provide cutouts for special details required and specified.

D. Rout doors for hardware using templates and location heights specified in Section, 08 71 00 DOOR HARDWARE.

E. Fit doors to frame, bevel lock edge of doors 3 mm (1/8 inch) for each 50 mm (two inches) of door thickness only undercut where shown to accommodate specific floor finishes and where approved by Architect.

F. Immediately after fitting and cutting of doors for hardware, seal cut edges of doors with two coats of water resistant sealer.

G. Finish surfaces, including both faces, top and bottom and edges of the doors smooth to touch.

H. Apply a steel astragal on the opposite side of active door on pairs of fire rated doors.

3.2 INSTALLATION OF DOORS APPLICATION OF HARDWARE

A. Install doors and hardware as specified in Section, 08 71 00 DOOR HARDWARE.

3.3 DOOR PROTECTION

A. As door installation is completed, place polyethylene bag or cardboard shipping container over door and tape in place.

B. Provide protective covering over knobs and handles in addition to covering door.

C. Maintain covering in good condition until removal is approved by Resident Engineer.

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SECTION 08 31 13
ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Section specifies access doors or panels.

1.2 RELATED WORK

A. Wire mesh and screen access doors: Section 05 50 00, METAL FABRICATIONS.

B. Lock Cylinders: Section 08 71 00, DOOR HARDWARE.

C. Access doors in acoustical ceilings: Section 09 51 00, ACOUSTICAL CEILINGS.

D. Locations of access doors for duct work cleanouts: Section 23 31 00, HVAC DUCTS AND CASINGS Section 23 37 00, AIR OUTLETS AND INLETS.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings: Access doors, each type, showing construction, location and installation details.

C. Manufacturer's Literature and Data: Access doors, each type.

D. LEED Information:

1. LEED Credit MR 4.1 and MR 4.2, Recycled Content: Product data indicating percentages, by weight of post-consumer and post-industrial recycled content for products having recycled content.
   a. Include statement indicating costs for each product having recycled content.
2. LEED Credit MR 5.1 and MR 5.2, Materials Extracted, Processed and Manufactured Regionally: Manufacturer’s data identifying point of origin for products procured within a 500 mile radius of the project.
   a. Include statement indicating costs for each product submitted.

1.4 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in the text by basic designation only.

B. American Society for Testing and Materials (ASTM):
A167-99(R-2004).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip

A1008-07.....Steel Sheet, Cold-Rolled, Carbon, Structural, High Strength Low-Alloy

C. American Welding Society (AWS):
D1.3-98.....Structural Welding Code Sheet Steel

D. National Fire Protection Association (NFPA):
80-06.....Fire Doors and Windows

E. The National Association of Architectural Metal Manufacturers (NAAMM):
AMP 500 Series.....Metal Finishes Manual

F. Underwriters Laboratories, Inc. (UL):
Fire Resistance Directory

PART 2 - PRODUCTS

2.1 FABRICATION, GENERAL

A. Fabricate components to be straight, square, flat and in same plane where required.
1. Slightly round exposed edges and without burrs, snags and sharp edges.
2. Exposed welds continuous and ground smooth.
3. Weld in accordance with AWS D1.3.

B. Number of locks and non-continuous hinges as required to maintain alignment of panel with frame.

C. Provide anchors or make provisions in frame for anchoring to adjacent construction. Provide size, number and location of anchors on four sides to secure access door in opening.

2.2 ACCESS DOORS, FLUSH PANEL

A. Door Panel:
1. Form of 1.9 mm (0.0747 inch) thick steel sheet.
2. Reinforce to maintain flat surface.

B. Frame:
1. Form of 1.5 mm (0.0598 inch) thick steel sheet of depth and configuration to suit material and type of construction where installed.
2. Provide surface mounted units having frame flange at perimeter where installed in concrete, masonry, or gypsum board construction.
3. Weld exposed joints in flange and grind smooth.

C. Hinge:
1. Concealed spring hinge to allow panel to open 175 degrees.
2. Provide removable hinge pin to allow removal of panel from frame.

D. Lock:

1. Flush, screwdriver operated cam lock.

2.3 FINISH

A. Provide in accordance with NAAMM AMP 500 series on exposed surfaces.

B. Steel Surfaces: Baked-on prime coat over a protective phosphate coating.

C. Stainless Steel: No. 4 for exposed surfaces.

2.4 SIZE

A. Minimum 600 mm (24 inches) square door unless otherwise shown or required to suit opening in suspension system of ceiling.

PART 3 - EXECUTION

3.1 LOCATION

A. Provide access panels or doors wherever any valves, traps, dampers, cleanouts, and other control items of mechanical, electrical and conveyor work are concealed in wall or partition, or are above ceiling of gypsum board or plaster.

B. Use fire rated doors in fire rated partitions and ceilings.

C. Use flush panels in partitions and gypsum board ceilings, except lay-in acoustical panel ceilings or upward access acoustical tile ceilings.

3.2 INSTALLATION, GENERAL

A. Install access doors in openings to have sides vertical in wall installations, and parallel to ceiling suspension grid or side walls when installed in ceiling.

B. Set frames so that edge of frames without flanges will finish flush with surrounding finish surfaces.

C. Set frames with flanges to overlap opening and so that face will be uniformly spaced from the finish surface.

3.3 ANCHORAGE

A. Secure frames to adjacent construction using anchors attached to frames or by use of bolts or screws through the frame members.

B. Type, size and number of anchoring device suitable for the material surrounding the opening, maintain alignment, and resist displacement during normal use of access door.

3.4 ADJUSTMENT

A. Adjust hardware so that door panel will open freely.

B. Adjust door when closed so door panel is centered in the frame.

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SECTION 08 33 00
COILING DOORS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies insulated and non-insulated coiling doors of sizes shown, complete as specified.

1.2 RELATED WORK

A. Section 01 81 13, SUSTAINABLE DESIGN REQUIREMENTS for additional LEED requirements.

B. Lock cylinders for cylindrical locks: Section 08 71 00, DOOR HARDWARE.

C. Finishes: Section 09 60 00, SCHEDULE OF FINISHES.

1.3 MANUFACTURER'S AND INSTALLER'S QUALIFICATIONS

A. Coiling doors shall be products of manufacturers regularly engaged in manufacturing items of type specified.

B. Install items under direct supervision of manufacturer's representative or trained personnel.

1.4 FIRE DOOR REQUIREMENTS

A. Where fire doors exceed the size for which testing and labeling is available, submit certificates stating that the doors and hardware is identical in design, materials, and construction to a door that has been tested and meets the requirements for the class indicated.

1.5 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings:

1. Each type of door showing details of construction, accessories and hardware and mechanical items supporting brackets for safety devices.

C. Manufacturer's Literature and Data:

1. Brochures or catalog cuts, each type door or grille.
2. Manufacturer's installation procedures and instructions.
3. Maintenance instructions, parts lists.

D. Certificates:

1. Attesting doors, anchors and hardware will withstand the horizontal loads specified.

2. Attesting oversize fire doors and hardware are identical in design, material, and construction to doors that meet the requirements for the class specified.

E. LEED Submittals:

1. Credit MR 5.1 & 5.2: For products manufactured within 500 miles of project site *and* whose raw materials are extracted, harvested or recovered, within 500 miles of the project site, documentation indicating the location and distance of material manufacturer and point of extraction, harvest, or recovery for each raw material from the Project site.

a. Include statement indicating cost for each regional material and the fraction by weight that is considered regional

1.6 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. American Society for Testing and Materials (ASTM):

A36/A36M-05	Structural Steel
A167-99 (R2004)	Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip
A653/A653M-07	Steel Sheet, Zinc-Coated (Galvanized) Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

C. National Fire Protection Association (NFPA):

80-06	Fire Doors and Fire Windows

D. National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500 Series	Metal Finishes Manual

E. Underwriters Laboratories, Inc. (UL):

2007	Fire Resistance Directory

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-Of-Design Product: Subject to compliance with requirements, provide Alpine Overhead Doors, Inc.; Fire-Tite-Rolling Door or comparable product by one of the following:

1. Acme Rolling Doors.

2. Cookson Company.

3. Cornell Iron Works, Inc.

4. Mahon Door Corporation.

5. McKeon Rolling Steel Door Company, Inc.
6. Overhead Door Corporation.
7. Raynor.
8. Wayne-Dalton Corp.
9. Windsor Door.

2.2 MATERIAL

A. Steel: A653 for forming operation. ASTM A36 for structural sections.

B. Bituminous Coating: Manufacturer's standard.

2.3 DESIGN REQUIREMENTS

A. Coiling doors shall be spring counter balanced, overhead coiling type, inside face mounted with guides at jambs set back a sufficient distance to provide a clear opening when door is in open position.

B. Doors, hardware, and anchors shall be designed to withstand a horizontal or wind pressure of 958 Pa (20 psf) of door area without damage.

C. Fire rated doors shall conform to the requirements specified herein and to NFPA 80 for the class indicated. Doors shall bear Underwriters Laboratories, Inc. label indicating the applicable fire rating.

D. Where doors in excess of 7.4 m^2 (80 sf) are indicated to be manually operated, provision shall be made in the design and construction that will permit future installation of electric-power operation.

2.4 FABRICATION

A. Curtains:

1. Form of interlocking slats of galvanized steel of shapes standard with the manufacturer, except that slats for exterior doors shall be flat type.
2. Thickness of slats shall be as required to resist loads specified except not less than the following:
   a. For doors less than 4500 mm (15 feet) wide: 0.75 mm (0.0299 inch).
   b. For doors from 4530 mm (15 feet 1 inch) to 6300 mm (21 feet wide): 0.90 mm (0.0359 inch).
   c. For doors wider than 6330 mm (21 feet 1 inch): 1.20 mm (0.0478 inch).
   d. For insulated doors:
      1) 23 mm (15/16 inch) depth.
      2) Double wall slats injected with polyurethane foam.
      3) Thermal Value: RSI/m = 4.8 (R = 6.25) minimum.

B. Endlocks and Windlocks:
   1. Manufacturer's stock design of galvanized malleable iron or galvanized steel or stamped cadmium steel for doors.
   2. The ends of each slat for exterior doors and each alternate slat for grilles and interior doors shall have endlocks.
   3. Doors shall have windlocks at ends of at least every sixth slat. Windlocks shall prevent curtain from leaving guide because of deflection from wind pressure or other forces.

C. Bottom Bar:
   1. Two angles of equal weight, one on each side, standard extruded aluminum members not less than 3 mm (0.125 inch) thick.
   2. Bottom bar designed to receive weather-stripping and safety device, and be securely fastened to bottom of curtain or grille.

D. Barrel and Spring Counterbalance:
   1. Curtain shall coil on a barrel supported at end of opening on brackets and be balanced by helical springs.
   2. Barrel fabricated of steel pipe or commercial welded steel tubing of proper diameter and thickness for the size of curtain, to limit deflection with curtain rolled up, not to exceed 1 in 400 (0.03 inch per foot) of span.
   3. Close ends of barrel with cast iron plugs, machined to fit the opening.
   4. Within the barrel, install an oil-tempered, helical, counter balancing steel spring, capable of producing sufficient torque to assure easy operation of the door curtain from any position.
   5. At least 80 percent of the door weight shall be counter balanced at any position.
   6. Spring-tension shall be adjustable from outside of bracket without removing the hood or motor operator.

E. Brackets:
   1. Steel plate designed to form end closure and support for hood and the end of the barrel assembly.
   2. End of barrel or shaft shall screw into bracket hubs fabricated of cast iron or steel.
   3. Equip bracket hubs or barrel plugs with prelubricated ball bearings, shielded or sealed.

F. Hoods:
   1. Galvanized steel, not less than 0.6 mm (0.0239 inch) thick.

2. Form hood to fit contour of end brackets.
3. Reinforce at top and bottom edges with rolled beads, rods or angles. Hoods more than 3600 mm (12 feet) in length shall have intermediate supporting brackets.
4. Fasten to brackets with screws or bolts and provide for attachment to wall with bolts.
5. Provide a weather baffle at the lintel or inside the hood of each exterior door to minimize seepage of air through the hood enclosure.

G. Guides:
1. Manufacturer's standard formed sections or angles of aluminum.
a. Aluminum sections not less than 5 mm (0.1875 inch) thick.
2. Form a channel pocket of sufficient depth to retain the curtain in place under the horizontal pressure specified, and prevent ends of curtain from slipping out of guide slots.
3. Top sections flared for smooth entry of curtain to vertical sections that will facilitate entry of curtain.
4. Provide stops to limit curtain travel above top of guides.
5. Provide guide of aluminum with replaceable wear strips to prevent metal to metal contact.
6. Mounting brackets shall provide closure between guides and jambs.

H. Weather-stripping:
1. At exterior doors provide replaceable sweep type continuous vinyl or neoprene weather seals on guides and across head on exterior to seal against wind infiltration.

I. Locking:
1. Provide hasps for pad locks furnished under Section, 08 71 00 DOOR HARDWARE.

2.5 FIRE DOORS

A. B-labeled fire doors shall be complete with hardware, accessories, and automatic closing device as required by NFPA 80.

B. Equip fire doors with an automatic closing mechanism actuated by fusible links to release at 54°C (130°F).

C. Doors shall be forced into a closed position by an auxiliary spring in the barrel which is inoperative during normal operation and when activated will not affect the adjustment of the counterbalance spring. The auxiliary spring shall exert pressure on the curtain until the release device is reset. Door shall come to rest on the floor without impact.

D. Control descent of curtain by an oscillating governor.

E. Provide handles for push up operation.

2.6 FINISHES

A. Steel and Galvanized-Steel Finishes:

1. Clean surfaces of steel free from scale, rust, oil and grease, and then apply a light colored shop prime paint after fabrication.
2. Galvanized steel: Apply a phosphate treatment and a corrosion inhibitive primer.
3. Powder-Coat Finish: Manufacturer’s standard powder-coat finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer’s written instructions for cleaning, pretreatment, application, and minimum dry film thickness.
4. Color: Refer to Section 09 06 00, SCHEDULE OF FINISHES.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install insulated and non-insulated, fire-rated and non-fire-rated doors in accordance with approved shop drawings and manufacturer's instructions.

B. Locate anchors and inserts for guides, brackets, motors, switches, hardware, and other accessories accurately.

C. Securely attach guides to adjoining construction with not less than 9 mm (3/8 inch) diameter bolts, near each end and spaced not over 600 mm (24 inches) apart.

3.2 REPAIR

A. Repair prime painted zinc-coated surfaces and bare zinc-coated surfaces that are damaged by the application of galvanizing repair compound. Spot prime all damaged shop prime painted surfaces including repaired prime painted zinc-coated surfaces.

B. Coiling Doors shall be lubricated, properly adjusted, and demonstrated to operate freely.

3.3 INSPECTION

A. Upon completion, doors shall be weathertight and doors shall be free from warp, twist, or distortion.

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SECTION 08 41 13
ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies aluminum entrance work including storefront construction, hung doors, and other components to make a complete assembly.

1.2 RELATED WORK

A. Glass and Glazing: Section 08 80 00, GLAZING.

B. Hardware: Section 08 71 00, DOOR HARDWARE.

C. Low Energy Power Assist Door Operators: Section 08 71 13.11, LOW ENERGY POWER ASSIST DOOR OPERATORS.

D. Blast Loading and Design Requirements: Section 08 56 53, BLAST RESISTANT WINDOWS.

E. Texture and color of finish: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings: (1/2 full scale) showing construction, anchorage, reinforcement, and installation details.

C. Manufacturer’s Literature and Data:

1. Doors, each type.
2. Entrance and Storefront construction.

D. Samples:

1. Door corner section, 450 mm x 450 mm (18 x 18 inches), of each door type specified, showing vertical and top hinge edges, door closer reinforcement, internal reinforcement and insulation, of flush panel door.
2. Two samples of anodized aluminum of each color showing finish and maximum shade range.

E. Manufacturer's Certificates:

1. Stating that aluminum has been given specified thickness of anodizing.
2. Indicating manufacturer's qualifications specified.

F. LEED Information:

1. LEED Credit MR 4.1 and MR 4.2, Recycled Content: Product data indicting percentages, by weight of post-consumer and post-industrial recycled content for products having recycled content.

a. Include statement indicating costs for each product having recycled content.

2. LEED Credit MR 5.1 and MR 5.2, Materials Extracted, Processed and Manufactured Regionally: Manufacturer’s data identifying point of origin for products procured within a 500 mile radius of the project.

a. Include statement indicating costs for each product submitted.

1.4 QUALITY ASSURANCE

A. Approval by Contracting Officer is required of products of proposed manufacturer, or supplier, and will be based upon submission by Contractor certification.

B. Certify manufacturer regularly and presently manufactures aluminum entrances and storefronts as one of their principal products.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver aluminum entrance and storefront material to the site in packages or containers; labeled for identification with the manufacturer's name, brand and contents.

B. Store aluminum entrance and storefront material in weather-tight and dry storage facility.

C. Protect from damage from handling, weather and construction operations before, during and after installation.

1.6 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. American Society for Testing and Materials (ASTM):

B209-06.....Aluminum and Aluminum-Alloy Sheet and Plate

B221-05.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

E283-04.....Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen

E331-00.....Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference

F468-06.....Nonferrous Bolts, Hex Cap Screws, and Studs for General Use

F593-04.....Stainless Steel Bolts, Hex Cap Screws, and Studs

C. National Association of Architectural Metal Manufacturers (NAAMM):
AMP 500 Series.....Metal Finishes Manual

D. American Architectural Manufacturer's Association (AAMA):
2604-05.....High Performance Organic Coatings on Architectural Aluminum Extrusions and Panels

E. American Welding Society (AWS):
D1.2-03.....Structural Welding Code Aluminum

1.7 PERFORMANCE REQUIREMENTS

A. Shapes and thickness of framing members shall be sufficient to withstand a design wind load of not less than 36 pounds per square foot) of supported area with a deflection of not more than 1/175 times the length of the member and a safety factor of not less than 1.65 (applied to overall load failure of the unit). Provide glazing beads, moldings, and trim of not less than 1.25 mm (0.050 inch) nominal thickness.

B. Framing members and connections shall be sufficient to withstand the blast loading requirements of Section 08 56 53, BLAST RESISTANT WINDOWS.

C. Air Infiltration: When tested in accordance with ASTM E 283, air infiltration shall not exceed 2.63 x 10-50 cm per square meter (0.06 cubic feet per minute per square foot) of fixed area at a test pressure of 0.30 kPa (6.24 pounds per square foot) 80 kilometers (50 mile) per hour wind.

D. Water Penetration: When tested in accordance with ASTM E 331, there shall be no water penetration at a pressure of 0.38 kPa (8 pounds per square foot) of fixed area.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum, ASTM B209 and B221:

1. Alloy 6063 temper T5 for doors, door frames, fixed glass sidelights, storefronts and transoms.
2. Alloy 6061 temper T6 for guide tracks for other extruded structural members.

B. Thermal Break: Manufacturer standard low conductive material retarding heat flow in the framework, where insulating glass is scheduled.

C. Fasteners:

1. Aluminum: ASTM F468, Alloy 2024.
2. Stainless Steel: ASTM F593, Alloy Groups 1, 2 and 3.

2.2 FABRICATION

A. Fabricate doors, of extruded aluminum sections not less than 3 mm (0.125 inch) thick. Fabricate glazing beads of aluminum not less than 1.0 mm (0.050 inch) thick.

B. Accurately form metal parts and accurately fit and rigidly assemble joints, except those joints designed to accommodate movement. Seal joints to prevent leakage of both air and water.

C. Make welds in aluminum in accordance with the recommended practice AWA D1.2. Use electrodes and methods recommended by the manufacturers of the metals and alloys being welded. Make welds behind finished surfaces so as to cause no distortion or discoloration of the exposed side. Clean welded joints of welding flux and dress exposed and contact surfaces.

D. Make provisions in doors and frames to receive the specified hardware and accessories. Coordinate schedule and template for hardware specified under Section 08 71 00, DOOR HARDWARE. Where concealed closers or other mechanisms are required, provide the necessary space, cutouts, and reinforcement for secure fastening.

E. Fit and assemble the work at the manufacturer's plant. Mark work that cannot be permanently plant-assembled to assure proper assembly in the field.

2.3 PROTECTION OF ALUMINUM

A. Isolate aluminum from contact with dissimilar metals other than stainless steel, white bronze, or zinc by any of the following:

1. Coat the dissimilar metal with two coats of heavy-bodied alkali resistant bituminous paint.
2. Place caulking compound, or non-absorptive tape, or gasket between the aluminum and the dissimilar metal.
3. Paint aluminum in contact with mortar, concrete and plaster, with a coat of aluminum paint primer.

2.4 FRAMES

A. Fabricate doors, frames, mullions, transoms, frames for fixed glass and similar members from extruded aluminum not less than 3 mm (0.125 inch) thick.

B. Provide integral stops and glass rebates and applied snap-on type trim.

C. Use concealed screws, bolts and other fasteners. Secure cover boxes to frames in back of all lock strike cutouts.

D. Fabricate framework with thermal breaks in frames where insulating glass is scheduled and specified under Section 08 80 00, GLAZING.

2.5 STILE AND RAIL DOORS

A. Nominal 45 mm (1-3/4 inch) thick, with stile and head rail 90 mm (3-1/2 inches) wide, and bottom rail 250 mm (10 inches) wide.

B. Bevel single-acting doors 3 mm (1/8 inch) at lock, hinge and meeting stile edges. Provide clearances of 2 mm (1/16 inch) at hinge stiles, 3 mm (1/8 inch) at lock stiles and top rails, and 5 mm (3/16 inch) at floors and thresholds. Form glass rebates integrally with stiles and rails. Glazing beads may be formed integrally with stiles and rails or applied type secured with fasteners at 150 mm (six inches) on centers.

C. Construct doors with a system of welded joints or interlocking dovetail joints between stiles and rails. Clamp door together through top and bottom rails with 9 mm (3/8 inch) primed steel rod extending into the stiles, and having a self-locking nut and washer at each end. Reinforce stiles and rails to prevent door distortion when tie rods are tightened. Provide a compensating spring-type washer under each nut to take up any stresses that may develop. Construct joints between rails and stiles to remain rigid and tight when door is operated.

D. Weather-stripping: Provide removable, woven pile type (silicone-treated) weather-stripping attached to aluminum or vinyl holder. Make slots for applying weather-stripping integral with doors and door frame stops. Apply continuous weather-stripping to heads, jambs, bottom, and meeting stiles of doors and frames. Install weather-stripping so doors can swing freely and close positively.

2.6 REINFORCEMENT FOR BUILDERS HARDWARE

A. Fabricate from stainless steel plates.

B. Hinge and pivot reinforcing: 4.55 mm (0.1793 inch) thick.

C. Reinforcing for lock face, flush bolts, concealed holders, concealed or surface mounted closers: 2.66 mm (0.1046 inch) thick.

D. Reinforcing for all other surface mounted hardware: 1.5 mm (0.0598 inch) thick.

2.7 FINISH

A. In accordance with NAAMM AMP 500 series.

B. Anodized Aluminum:

1. Clear Finish: Chemically etched medium matte, with clear anodic coating, Class I Architectural, 0.7 mils thick.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Allowable Installation Tolerances: Install work plumb and true, in alignment and in relation to lines and grades shown. Variation of 3 mm (1/8 inch) in 2400 mm (eight feet), non-accumulative, is maximum permissible for plumb, level, warp, bow and alignment.

B. Anchor aluminum frames to adjoining construction at heads, jambs and bottom and to steel supports, and bracing. Anchor frames with stainless steel or aluminum countersunk flathead, expansion bolts or machine screws, as applicable. Use aluminum clips for internal connections of adjoining frame sections.

C. Where work is installed within masonry or concrete openings, place no parts other than built-in anchors and provision for operating devices located in the floor, until after the masonry or concrete work is completed.

D. Install hardware specified under Section 08 71 00, DOOR HARDWARE.

E. Install hung door operators specified under Section 08 71 13.11, LOW ENERGY POWER ASSIST DOOR OPERATORS.

3.2 ADJUSTING

A. After installation of entrance and storefront work is completed, adjust and lubricate operating mechanisms to insure proper performance.

3.3 PROTECTION, CLEANING AND REPAIRING

A. Remove all mastic smears and other unsightly marks, and repair any damaged or disfiguration of the work. Protect the installed work against damage or abuse.

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SECTION 08 42 29
AUTOMATIC ENTRANCES

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies equipment, controls and accessories for automatic operation of swing and sliding doors.

1.2 RELATED WORK

A. Aluminum frames entrance work; Section 08 41 13, ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS.

B. Door hardware; Section 08 71 00, DOOR HARDWARE.

C. Section 28 13 00, ACCESS CONTROL.

D. Glass and glazing of doors and frames; Section 08 80 00, GLAZING.

E. Electric general wiring, connections and equipment requirements; Division 26, ELECTRICAL.

F. Section 28 31 00, FIRE DETECTION AND ALARM.

1.3 QUALITY ASSURANCE

A. Automatic door operators, controls and other equipment shall be products of a manufacturer regularly engaged in manufacturing such equipment for a minimum of three years.

B. One type of automatic door equipment shall be used throughout the building.

C. Equipment installer shall have specialized experience and shall be approved by the manufacturer.

1.4 WARRANTY

A. Automatic door operators shall be subject to the terms of the "Warranty of Construction" Article of Section 00 72 00, GENERAL CONDITIONS, except that the Warranty period shall be two years in lieu of one year.

1.5 MAINTENANCE MANUALS

A. In accordance with Section 01 00 00, GENERAL REQUIREMENTS Article titled "INSTRUCTIONS", furnish maintenance manuals and instructions on automatic door operators.

1.6 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's literature and data describing operators, power units, controls, door hardware and safety devices.

C. Shop Drawings:
   1. Showing location of controls and safety devices in relationship to each automatically operated door.
   2. Showing layout, profiles, product components, including anchorage, accessories, as applicable.
   3. Submit templates, wiring diagrams, fabrication details and other information to coordinate the proper installation of the automatic door operators.

D. Submit in writing to Resident Engineer that items listed in Article 1.3 are in compliance.

1.7 DESIGN CRITERIA

A. As a minimum automatic door equipment shall comply with the requirements of BHMA 156.10. Except as otherwise noted on drawings, provide operators which will move the doors from the fully closed to fully opened position in // three // five // seven // seconds maximum time interval, when speed adjustment is at maximum setting.

B. Equipment: Conforming to UL 325. Provide key operated power disconnect wall switch for each door installation.

C. Electrical Wiring, Connections and Equipment: Provide all motor, starter, controls, associated devices, and interconnecting wiring required for the installation. Equipment and wiring shall be as specified in Division 26, ELECTRICAL.

1.8 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. Builders Hardware Manufacturers Association, Inc. (BHMA):
   A156.10-05.....Power Operated Pedestrian Doors (BHMA 1601)

C. National Fire Protection Association (NFPA):
   101-09.....Life Safety Code

D. Underwriters Laboratory (UL):
   325-10.....Door, Drapery, Gate, Louver, and Window Operators and Systems

1.9 DELIVERY AND STORAGE

A. Delivery shall be in factory’s original, unopened, undamaged container with identification labels attached.

PART 2 - PRODUCTS

2.1 SWING DOOR OPERATORS

A. General: Swing door operators shall be of institutional type, door panel size 600 mm to 1250 mm (2'-0" to 5'-0") width, weight not to exceed 300 kg (600 pounds), electric operated for overhead mounting within the header or transom. Furnish metal mounting supports, brackets and other accessories necessary for the installation of operators at the head of the door frames. The motor on automatic door operator shall be provided with an interlock so that the motor will not operate when doors are electrically locked from opening.

B. Operators shall have checking mechanism providing cushioning action at last part of door travel, in both opening and closing cycle. Operators shall be capable of recycling doors instantaneously to full open position from any point in the closing cycle when control switch is activated. Operators shall, when automatic power is interrupted or shut-off, permit doors to easily open manually without damage to automatic operator system.

C. Operator, enclosed in housing, shall open door by energizing motor and shall stop by electrically reducing voltage and stalling motor against mechanical stop. Door shall close by means of spring energy, and close force shall be controlled by gear system and motor being used as dynamic break without power, or controlled by hydraulic closer in electro-hydraulic operators. System shall operate as manual door control in event of power failure. Opening and closing speeds shall be adjustable:

1. Operator Housing: Housing shall be a minimum of 112 mm (4-1/2 inches) wide by 140 mm (5.5 inches) high aluminum extrusions with enclosed end caps for application to 100 mm (4 inches) and larger frame systems. All structural sections shall have a minimum thickness of 3.2 mm (0.125 inch) and be fabricated of a minimum of 6063-T5 aluminum alloy.
2. Power Operator: Completely assembled and sealed unit which shall include gear drive transmission, mechanical spring and bearings, all located in aluminum case and filled with special lubricant for extreme temperature conditions. Complete unit shall be rubber mounted with provisions for easy maintenance and replacement, without removing door from pivots or frame.

3. Connecting hardware shall have drive arm attached to door with a pin linkage rotating in a self-lubricating bearing. Door shall not pivot on shaft of operator.
4. Electrical Control: Operator shall have a self contained electrical control unit, including necessary transformers, relays, rectifiers, and other electronic components for proper operation and switching of power operator. All connecting harnesses shall have interlocking plugs.

2.2 MICROPRCESSOR CONTROLS

A. The system shall include a multi-function microprocessor control providing adjustable hold open time (1–30 seconds), LED indications for sensor input signals and operator status and power assist close options. Control shall be capable of receiving activation signals from any device with normally open dry contact output. All activation modes shall provide fully adjustable opening speed:

B. The door shall be held open by low voltage applied to the continuous duty motor. The control shall include an adjustable safety circuit that monitors door operation and stops the opening direction of the door if an obstruction is sensed. The motor shall include a recycle feature that reopens the door if an obstruction is sensed at any point during the closing cycle. The control shall include a standard three position key switch with functions for ON, OFF, and HOLD OPEN, mounted on operator enclosure, door frame, or wall, as indicated in the architectural drawings.

2.3 SLIDING DOOR OPERATORS

A. General: Sliding doors shall have electric operators, conforming to BHMA A156.10 and the following requirements as applicable. Assembly shall be single or bi-parting sliding doors as shown on drawings.

B. Door Operation: Doors shall be opened by electric motor pulling door from closed to open position and shall stop door by electrically reducing voltage and stalling door against mechanical stop. System shall permit manual control of door in event of power failure. Opening and closing speeds shall be adjustable. In compliance with NFPA-101, all door panels shall allow "breakout" to the full open position to provide instant egress at any point in the door’s movement.

C. Operators: Completely assembled and sealed electromechanical operating unit, all located in cast aluminum housing and filled with special lubricant for extreme conditions. Attached to transmission system shall

be a minimum 1/8 Hp "DC" shunt-wound permanent magnet motor with sealed ball bearings. Complete unit shall be rubber mounted with provisions for easy maintenance and replacement. Operators shall have adjustable opening and closing cycle. Housing shall be minimum 6063T-5 alloy aluminum not less than .005 mm (125 inch) minimum thickness, 150 mm by 200 mm (6 inch wide by 8 inch high).

D. Sliding Door Hardware Guide Rollers, Door Carrier: Top door carriers shall ride on steel or delrin rollers incorporating sealed bearings with each door having two support rollers and one anti-rise roller. Each roller shall have a minimum of 9 mm (3/8-inch) of vertical adjustment with positive mechanical locks. Each door shall also include two urethane covered oil impregnated bearing bottom rollers attached with 5 mm (3/16-inch) thick formed steel guide brackets. Each door carrier supporting a door leaf shall include a vertical steel reinforcing member to prevent sagging when door is swung under breakaway conditions. All carbon steel brackets and fittings shall be plated for corrosion resistance.

E. Locking Hardware: Do not provide any locking hardware at interior doors not requiring physical security. Provide doors with flush concealed vertical rod panic hardware integrated into the doors where physical security is required and free egress is required at all times. Provide doors with manufacturers' standard hookbolt lock (keyed both sides) where physical security is required and free egress is not required at all times. At doors with access control devices (card readers, etc.), provide doors with electronic deadbolt locking to prevent the doors from manually sliding open.

F. Door Closers: Provide all breakout or swing-out panels with door closers concealed in the top rail of the door.

2.4 POWER UNITS

Each power unit shall be self-contained, electric operated and independent of the door operator. Capacity and size of power circuits shall be in accordance with automatic door operator manufacturer's specifications and Division 26 – ELECTRICAL.

2.5 DOOR CONTROLS

A. Opening and closing actions of doors shall be actuated by controls and safety devices specified, and conform to ANSI 156.10. Controls shall cause doors to open instantly when control device is actuated; hold

doors in open positions; then, cause doors to close, unless safety device or reactivated control interrupts operation.

B. Manual Controls:

1. Push Plate Wall Switch: Recess type, stainless steel push plate minimum 100 mm by 100 mm (four-inch by four-inch), with 13 mm (1/2-inch) high letters "To Operate Door--Push" engraved on face of plate.

C. Motion Detector: The motion detector may be surface mounted or concealed, to provide a signal to actuate the door operator, and monitor the immediate zone, to detect intrusion by persons, carts or similar objects. The zone which the detector monitors shall be 1500 mm (five feet) deep and 1500 mm (five feet) across, plus or minus 150 mm (six inches) on all dimensions. The maximum response time shall be no less than 25 milliseconds. Unit shall be designed to operate on 24 volts AC. The control shall not be affected by cleaning material, solvents, dust, dirt and outdoor weather conditions.

2.6 SAFETY DEVICES

A. General: Area over which doors swing or slide shall be a safety section and anyone standing in path of door's movement shall be protected by a safety device.

B. At sliding doors, provide two photoelectric beams mounted at heights of 600 mm (24 inches) and 1200 mm (48 inches) in the door frame on sliding doors. Provide overhead safety presence sensors at door head on each side of the opening. Beams shall parallel door openings to prevent doors from closing when anyone is in the center of the door or doors. When beams are activated, doors shall recycle to full open position. Actuation shall include a motion detector mounted on each side of the door for detection of traffic in each direction.

C. Each swing door shall have installed on the pull side a presence sensor to detect any person standing in the door swing path and prevent the door from opening.

D. Time delay switches shall be adjustable between 3 to 60 seconds and shall control closing cycle of doors.

E. Decals with sign "In" or "Do Not Enter" shall be installed on both faces of each door where shown.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Coordinate installation of equipment with other related work. Manual controls and power disconnect switches shall be recessed or semi-flush mounted in partitions. Secure operator components to adjacent construction with suitable fastenings. Conceal conduits, piping, and electric equipment, in finish work.

B. Install power units in locations shown. Where units are to be mounted on walls, provide metal supports or shelves for the units. All equipment, including time delay switches, shall be accessible for maintenance and adjustment.

C. Operators shall be adjusted and must function properly for the type of traffic (pedestrians, carts, stretchers and wheelchairs) expected to pass through doors. Each door leaf of pairs of doors shall open and close in synchronization. On pairs of doors, operators shall allow either door to be opened manually without the other door opening.

D. Install controls at positions shown and make them convenient for particular traffic expected to pass through openings. Maximum height of push plate wall switches from finished floors shall be 40 inches unless otherwise approved by the Resident Engineer.

3.2 INSTRUCTIONS

A. Following the installation and final adjustments of the door operators, the installer shall fully instruct VA personnel for // 2 hours // 4 hours // on the operating, servicing and safety requirements for the swing and sliding automatic door operators.

B. Coordinate instruction to VA personnel with VA Resident Engineer.

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SECTION 08 44 13
GLAZED ALUMINUM CURTAIN WALLS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Section specifies glazed aluminum curtain wall system.
   1. Thermally isolated, pressure equalized on interior.
   2. Type: Stick system to include following:
      a. Glass, Insulated Metal Panels, Uninsulated Metal Panels, Glass Spandrel Panels.
      b. Integral reinforcing.
      c. Closures, trim, subsills and flashings.
      d. Column covers.
      e. Fasteners, anchors, and related reinforcement.

1.2 RELATED WORK

A. Structural steel: Section 05 12 00, STRUCTURAL STEEL FRAMING.
B. Miscellaneous metal members: Section 05 50 00, METAL FABRICATIONS.
C. Firestopping between curtain wall and structure: Section 07 84 00, FIRESTOPPING.
D. Sheet metal flashing and trim: Section 07 60 00, FLASHING AND SHEET METAL.
E. Joint sealants: Section 07 92 00, JOINT SEALANTS.
F. Aluminum and glass hinged entry doors and storefront construction: Section 08 41 13, ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS.
G. Aluminum windows: Section 08 51 13, ALUMINUM WINDOWS.
H. Metal framed skylights: Section 08 63 00, METAL-FRAMED SKYLIGHTS.
I. Glazing: Section 08 80 00, GLAZING.
J. Finish Color: Section 09 06 00, SCHEDULE FOR FINISHES.
K. Louvers and wall vents: Section 08 90 00, LOUVERS AND VENTS.
L. Blast Loading and Design Requirements: Section 08 56 53, BLAST RESISTANT WINDOWS.

1.3 QUALITY ASSURANCE

A. Qualifications:
   1. Approval is required of products or service of proposed manufacturer, suppliers and installers, and will be based upon submission by Contractor of certification that:
      a. Manufacturers Qualifications: Manufacturer with five (5) years continuous documented experience in design, fabrication, and installation of glazed aluminum curtain wall systems of type and size required for that project.

b. Installer: Manufacturer approved in writing. Continuously installed glazed aluminum curtain walls systems for previous five (5) years.

c. Manufacturer shall provide technical field representation at project site, as a minimum, at start of project, during middle, towards end of project, and during field testing of field mockup panel.

d. Testing Laboratory: Contractor retained. Engage an AAMA accredited commercial testing laboratory to perform tests specified. Submit information regarding testing laboratory’s facilities and qualifications of technical personnel to perform testing specified in this section.

e. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of glazed aluminum curtain wall system. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, one another, and adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, or in-service performance.

1) Do not modify intended aesthetic effects. If modifications are proposed, submit comprehensive explanatory data for review.

f. Qualification of Welders:

1) Welding shall be performed by certified welders qualified in accordance with AWS D1.2, using procedures, materials, and equipment of the type required for this work.

B. Pre-Installation Conference:

1. Prior to starting installation of glazed curtain wall system schedule conference with Contracting Officer to ensure following:

a. Clear understanding of drawings and specifications.

b. Onsite inspection and acceptance of structural and pertinent structural details relating to curtain wall system.

c. Coordination of work of various trades involved in providing system. Conference shall be attended by Contractor; personnel directly responsible for installation of curtain wall system, flashing and sheet metal work, firestopping system and curtain wall manufacturer and their Technical Field Representatives. Conflicts shall be resolved and confirmed in writing.

1.4 SUBMITTALS

A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Product Data:
   1. Manufacturer’s standard details and fabrication methods.
   2. Data on finishing, components, and accessories.
   3. Instructions: Submit descriptive literature, detail specifications, available performance test data and instructions for installation, and adjustments.
   4. Recommendations for maintenance and cleaning of exterior surfaces.

C. Shop Drawings:
   1. Show elevations of glazed curtain wall system at 1:50 (1/4 inch) scale, metal gages, details of construction, methods of anchorage, glazing details, and details of installation.
   2. Submit for curtain wall system, accessories, and mock-up. Tentative approval of drawings shall be received before fabrication of mock-up. Final approval of drawings shall be deferred pending approval of mock-up and accessories. Drawings shall indicate in detail all system parts including elevations, full size sections, framing, jointing, panels, types and thickness of metal anchorage details, flashing and coping details, field connections, weep and drainage system, finishes, sealing methods, glazing, glass sizes and details, firestopping insulation materials, and erection details.
   3. Windows.
   4. Operation and Maintenance Manuals
      a. Submit cleaning and maintenance instructions.

D. Samples:
   1. Submit pairs of samples of each specified color and finish on 300 mm (12-inch) long section by width of each tubular, or extruded shape section or 300 mm by 300 mm (12-inch by 12-inch) wide sections of sheet shapes.
   2. Submit corner section of framing members showing fasteners, panels, glazing methods, glazing materials, and weather-stripping. Submit one sample minimum 300 mm by 300 mm (12 inches by 12 inches). In lieu of submitting separate samples for corner section, intermediate section, and panel, one composite sample incorporating all components and features listed may be submitted.
   3. Where normal color variations are anticipated, include 2 or more units in set indicating extreme limits of color variations.

E. Glass:
   1. Specified in Section 08 80 00, GLAZING.
F. Quality Control Submittals:
   1. Design Data:
      a. Submit structural and thermal calculations for complete wall assembly. Structural calculations and design shop drawings shall be signed and sealed by a structural engineer registered in state in which project is to be located.
   2. Factory Test Reports:
      a. Test Reports: Provide certified test reports, for each of following listed tests, from a qualified independent testing laboratory showing that glazed aluminum curtain wall system assembly has been tested in accordance with specified test procedures and complies with performance characteristics as indicated by manufacturer’s testing procedures. Manufacturer shall submit appropriate testing numbers for specific tests indicated below.
         1) Deflection and structural tests.
         2) Water penetration tests.
         3) Air infiltration tests.
         4) Delamination tests.
         5) Thermal conductance tests.
         6) Sound transmission loss test.
         7) Submit factory tests required except that where a curtain wall system or component of similar type, size, and design as specified for this project has been previously tested within last year, under conditions specified herein, resulting test reports may be submitted in lieu of listed testing.
G. Manufacturer's Certificates:
   1. Submit Certificates of Compliance, with specification requirements, for the following:
      a. Metal extrusions.
      b. Metal accessories.
      c. Stating that aluminum has been given specified thickness of anodizing or organic coating finish.
      d. Indicating manufacturer’s and installer’s meet qualifications as specified.
      e. Submit list of equivalent size installations, for both manufacturer and installer, which have had satisfactory and efficient operation.

H. Manufacturer’s Field Reports:
   1. Submit field reports of manufacturer’s field representative observations of curtain wall installation indicating observations made during inspection at beginning of project, during middle of installation and at conclusion of project. Indicate results of field testing of mockup field panel, and any directions given Contractor for corrective action.

I. LEED Information:
   1. LEED Credit MR 4.1 and MR 4.2, Recycled Content: Product data indicting percentages, by weight of post-consumer and post-industrial recycled content for products having recycled content.
      a. Include statement indicating costs for each product having recycled content.
   2. LEED Credit MR 5.1 and MR 5.2, Materials Extracted, Processed and Manufactured Regionally: Manufacturer’s data identifying point of origin for products procured within a 500 mile radius of the project.
      a. Include statement indicating costs for each product submitted.

1.5 DELIVERY, STORAGE AND HANDLING

A. Refer to AAMA CW 10 for care and handling of architectural aluminum from shop to site.

B. Prior to packaging for shipment from factory, mark wall components to correspond with shop and erection drawings and their placement location and erection.

C. Prior to shipment from factory, place knocked-down lineal members in cardboard containers and cover finished surfaces of members with protective covering of adhesive paper, waterproof tape, or strippable plastic. Do not cover metal surfaces that will be in contact with sealants after installation.

D. Inspect materials delivered to site for damage; unload and store with ventilation, free from heavy dust, not subject to combustion products or sources of water, and shall permit easy access for inspection and handling. Sealing and caulking compounds, including handling, shall be in accordance with requirements of Section 07 92 00 JOINT SEALANTS.

1.6 PROJECT CONDITIONS

A. Field Measurements: Where glazed aluminum curtain wall systems are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying Work.

1.7 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to extent referenced. Publications are referred to in text by basic designation only.

B. American Architectural Manufacturers Association (AAMA):

MCWM-1-89.....Metal Curtain Wall Manual
CW 10-04.....Care and Handling of Architectural Aluminum from Shop to Site
CW 11-85.....Design Windloads for Buildings and Boundary Layer Wind Tunnel Testing
CW 13-85.....Structural Sealant Glazing Systems (A Design Guide)
CWG 1-89.....Installation of Aluminum Curtain Walls
TIR A1-04.....Sound Control for Aluminum Curtain Walls and Windows
TIR A4-97.....Recommended Guide Lines for Reflective Insulating Glass
TIR A8-04.....Structural Performance of Poured and Debridged Framing Systems
TIR A9-91.....Metal Curtain Wall Fasteners
TIR A11-96.....Maximum Allowable Deflection of Framing Systems for Building Cladding Components of Design Wind Loads
101-I.S.2/A440-05.....Windows, Doors and Unit Skylights
501-05.....Methods of Test for Exterior Walls
503-03.....Field Testing of Metal Storefronts, Curtain walls and Sloped Glazing Systems
605-98.....High Performance Organic Coatings on Architectural Extrusions and Panels
1503-98.....Thermal Transmission and Condensation Resistance of Windows, Doors and Glazed Wall Sections

C. American National Standards Institute (ANSI):

Z97.1-04.....Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test

D. American Society of Civil Engineers (ASCE):

7-02-2003.....Minimum Design Loads for Buildings and Other Structures

E. American Society for Testing and Materials (ASTM):

A36/A36M-05.....Structural Steel

A123-02.....Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

A193-05.....Alloy-Steel and Stainless Steel Bolting Materials for High Temperature Service

A307-04.....Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength

B209-04.....Aluminum and Aluminum Alloy Sheet and Plate

B211-03.....Aluminum and Aluminum Alloy Bar, Rod, Wire

B221/B221M-05.....Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Shapes and Tubes

B316/B316M-02.....Aluminum and Aluminum Alloy Rivet and Cold-Heading, Wire, and Rods

C578-05.....Rigid Cellular Polystyrene Thermal Insulation

C612-04.....Mineral Fiber Block and Board Thermal Insulation

C920-05.....Elastomeric Joint Sealants

C794-93.....Standard Test Method for Adhesion-In-Peel of Elastomeric Joint Sealants.

C1363-05.....Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus

D1037-99.....Evaluating the Properties of Wood-Base Fibers and Particle Panel Materials

E84-05.....Surface Burning Characteristics of Building Materials

E90-04.....Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements

E283-04.....Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors under Specified Pressure Difference Across this Specification

E330-02.....Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference

E331-00.....Water Penetration of Exterior Windows, Curtain Walls, and Doors By Uniform Static Air Pressure Difference

E413-04.....Classification for Rating Sound Insulation

E783-02.....Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors.

E1105-00.....Field Determination of Water Penetration of Installed Exterior Windows, Curtain Walls, and Doors By Uniform or Cyclic Static Air Pressure Differences

F. American Welding Society, Inc. (AWS):
D1.2-03.....Structural Welding Code-Aluminum

G. Consumer Product Safety Commission (CPSC):
16 CFR 1201.....Architectural Glazing Standards and Related Material

H. Federal Specifications (FS):
TT-P-645B-90.....Primer, Paint, Zinc-Molybdate, Alkyd Type

I. Glass Association of North America (GANA):
01.....Glazing Manual (1997 Edition).
02.....Sealant Manual (1990 Edition).
03.....Laminated Glass Design Guide (2000 Edition).
04.....Tempered Glass Engineering Standard Manual (2001 Edition).

J. Military Specifications (MIL):
MIL-C-18480.....(Rev. B) Coating Compound, Bituminous Solvent, Coal Tar Base

K. National Association of Architectural Metal Manufacturers (NAAMM):
500 Series (1988).....Metal Finishes Manual.

L. Steel Structures Painting Council (SSPC)
Paint 25-97 (2004).....Red Iron Oxide Raw Linseed Oil and Alkyd Primer (Without Lead and Chromate Pigments

1.8 WARRANTY

A. Submit manufacturer’s written warranty for materials, installation and weathertightness, and subject to terms of “Warranty of Construction”, FAR clause 52.246-21, except that warranty period shall be extended to five (5) years from date of final acceptance of project by Government.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Basis of Design Product: Subject to compliance in requirements, provide specified manufactures and product system conforming to the Design & Performance Requirements in this section:
1. Curtain wall (E/S) Vistawall Reliance Series.
2. Curtain wall and integral aluminum sunshade (IN) Vistawall Reliance Series.

B. Comparable Manufacturer:
1. Wausau.

2. YKK.

C. Design Requirements:

1. Curtain Wall System: Tubular aluminum sections with thermal break condition supplementary support framing, factory prefinished, vision glass, glass, insulated metal panel spandrel infill, and louvers; related flashings, anchorage and attachment devices.
2. System Assembly: Shop unitized assembly.
3. No curtain wall framing member shall deflect, in a direction normal to plane of wall, more than 1/175 of its clear span or 20 mm (3/4 inch), whichever is less, when designed in accordance with requirements of TIR A11 and tested in accordance with ASTM E330, except that when a gypsum wallboard surface will be affected, deflection shall not exceed 1/360 of span. No framing member shall have a permanent deformation in excess of 0.2 percent of its clear span when tested in accordance with ASTM E330 for a minimum test period of 10 seconds at 1.5 times design wind pressures indicated as part of structural drawing wind load requirements. No glass breakage, damage to fasteners, hardware or accessories shall be permitted due to deformation stated above:
   a. Provide system complete with framing, mullions, trim, fasteners, anchors, accessories, concealed auxiliary members, and attachment devices for securing wall to structure as specified or indicated. Unless noted otherwise, comply with MCWM-1.
   b. Curtain wall system components and integral door and/or window units shall be furnished by one manufacturer or fabricator; however, all components need not be products of same manufacturer.
   c. Fully coordinate system accessories directly incorporated, and adjacent to contiguous related work and insure materials compatibility, deflection limitations, thermal movements, and clearances and tolerances as indicated or specified.
   d. Provide system with adequate allowances for expansion and contraction of components and fastenings to prevent buckling damage, joint seal failure, glass breakage, undue stress on fastenings or other detrimental effects. For design purposes, base provisions for thermal movement on assumed ambient temperature range of from -18 degrees C to 49 degrees C (0 degrees F to 120 degrees F).
   e. Provide wall system to accommodate tolerances in building frame and other contiguous work as indicated or specified.

D. Manufacturer’s Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of kind indicated. Engineering services are defined as those performed for installations of curtain walls that are similar to those indicated for this Project in material, design, and extent.

E. Performance Requirements:
   1. System shall meet or exceed all performance requirements specified.
   2. Curtain wall components shall have been tested in accordance with requirements below and shall meet performance requirements specified:
   3. System Design: Design and size components to withstand dead loads and live loads caused by positive and negative wind loads acting normal to plane of wall as calculated in accordance with IBC 2006 code and as calculated in accordance with ASCE 7-Minimum Design Loads for Buildings and Other Structures to a design pressure as indicated on the drawings and as measured in accordance with ASTM E330.
   4. Blast Design: Requirements of Section 08 56 53, BLAST RESISTANT WINDOWS.
   5. Seismic Loads: Design and size components to withstand seismic loads and sway displacement as calculated in accordance with IBC 2006 code.
   6. Water Penetration:
      a. No water penetration shall occur when wall is tested in accordance with ASTM E331 at a differential static test pressure of 20 percent of inward acting design wind pressure as indicated on structural drawings, but not less than 479 Pa (10 psf).
      b. Make provision in wall construction for adequate drainage to outside of water leakage or condensation that occurs within outer face of wall. Leave drainage and weep openings in members and wall open during test.
   7. Air Infiltration: Test glazed aluminum curtain wall system according to AAMA 503, which requires testing according to ASTM E783
      a. Static-Air-Differential: 75 Pa (1.57 lbf/sq. ft.) minimum.
      b. Air Leakage: 0.03 L/s per sq. m (0.06 cfm/sq ft) of surface maximum.
   8. Deflections Test: ASTM E330, Procedure B:
      a. No member shall deflect in a direction parallel to plane of wall, when carrying its full design load, more than an amount which will reduce edge cover or glass bite below 75 percent of design dimension. No member after deflection under full design load, shall have a clearance between itself and top of panel, glass,

sash, or other part immediately below it less than 3 mm (1/8 inch); clearance between member and an operable window or door shall be minimum 1.5 mm (1/16 inch).

9. Delamination Test:
   a. Adhesively bonded metal-faced insulated panels shall show no evidence of delamination, warpage or other deterioration or damage when subjected to the six "Accelerated Aging Cycles" specified in ASTM D1037.
10. Thermal Conductance Tests: ASTM C236.
   a. The thermal transmittance of opaque panels shall not exceed a U-value, Btu/hr/sq ft/ degree F, as required and indicated on contract drawings for exterior wall system, when tested in accordance with ASTM C236. Average calculated thermal transmittance of complete wall assembly including panels, windows, and all other components shall not exceed a U-value of 0.60.
11. Window Tests:
   a. Windows shall meet the requirements specified in Section 08 51 13 ALUMINUM WINDOWS, except where requirements of this section differ, this section shall govern. Windows shall meet same requirements for deflection and structural adequacy as specified for framing members when tested in accordance with ASTM E330 except permanent deformation shall not exceed 0.4 percent; there shall be no glass breakage, and no permanent damage to fasteners, or anchors. Windows shall have no water penetration when tested in accordance with requirements of ASTM E331.
12. Sound Attenuation Through Wall System (Exterior to Interior):
   a. STC 50, measured in accordance with ASTM E413.

2.2 MATERIALS

A. Extruded Aluminum Framing Members: ASTM B221M; 6063-T5 extruded aluminum for non-structural components or 6063-T6 extruded aluminum for structural members; temper and alloy as recommended by manufacturer.

B. Sheet Aluminum: ASTM B209M; 6065-T5 temper and alloy as recommended by manufacturer.
   1. Formed flashing: Minimum 1.58 mm (0.062 inch) thick aluminum, in finish as selected.
   2. Extruded sill members: Minimum 1.58 mm (0.062 inch) thick aluminum, in finish as selected.

C. Steel Sections: ASTM A36M.

D. Primer: TS TT-P-645; red, for shop application and field touch-up.

E. Fasteners:
   1. For Exterior Cap Retainers: ASTM A193 B8 300 series, stainless steel screws.
   2. For Framework Connections: ASTM B211M 2024-T4 aluminum, ASTM A193 B8 300 series, stainless steel, and ASTM B316 aluminum rivets, as required by connection.
   3. For Anchoring Glazed Aluminum Curtain Wall to Support Structure: ASTM A307 zinc plated steel fasteners.

F. Shims: Metal or plastic.

G. Joint Sealants and Accessories:
   1. In accordance with requirements specified in Section 07 92 00, JOINT SEALANTS.
   2. Structural Flush Glazed Joints: High performance silicone sealant applied in accordance with manufacturer's recommendations.
   3. Non-structural Flush Glazed Joints and Weather Seal Joints: Silicone sealants applied in accordance with manufacturer's recommendations.
   4. Structural silicone sealant performance requirements: ASTM C920.
      a. Hardness: Type A, 30 durometer.
      b. Ultimate Tensile Strength: 1172 kPa (170 psi).
      c. Tensile at 150% Elongation: 55 kPa (80 psi).
      d. Joint Movement Capability after 14 Day Cure: +/- 50%.
      e. Peel Strength aluminum, after 21 Day Cure: 599 g/mm (34 pounds per inch).
   5. Structural silicone shall not be used to support dead weight of vertical glass or panels.
   6. Comply with recommendations of sealant manufacturer for specific sealant selections.
   7. Provide only sealants that have been tested per ASTM C794 to exhibit adequate adhesion to samples of glass and metal equivalent to those required for project.
   8. Exposed metal to metal joints: Silicone sealant selected from manufacturer’s standard colors.

H. Glazing Materials:
   1. As specified under Section 08 80 00, GLAZING.
   2. Glazing Gaskets:
      a. Exterior: Continuous EPDM gaskets at each glass and spandrel panel.
      b. Interior: Continuous, closed cell PVC foam sealant tape, sealed at corners.

3. Glass Sizes and Clearances:
   a. Accommodate up to 28.575 mm (1-1/8 inch) glazing.
   b. Sizes indicated are nominal. Verify actual sizes required by measuring frames. Coordinate dimensions for glass and glass holding members to meet applicable minimum clearances as recommended by glass manufacturer. Do not nip glass to remove flares or to reduce oversized dimensions. All cutting shall occur in factory.
4. Glass Setting Materials:
   a. Provide head bead and drive wedge required for glass installation to suit curtain wall system in accordance with manufacture’s recommendations.

I. Louvers:
1. As specified under Section 08 90 00, LOUVERS AND VENTS.

J. Louver Screening:
1. As specified under Section 08 90 00, LOUVERS AND VENTS.

K. Firestopping: Refer to Section 07 84 00, FIRESTOPPING for requirements.

2.3 FABRICATION

A. Curtain wall components shall be of materials and thickness indicated or specified. Details indicated are representative of required design and profiles. Maintain sightlines indicated on drawings. Unless specifically indicated or specified otherwise, methods of fabrication and assembly shall be at discretion of curtain wall manufacturer. Perform fitting and assembling of components in shop to maximum extent practicable. Anchorage devices shall permit adjustment in three directions. There shall be no exposed fasteners.

B. Joints: Joints exceeding +1.5 mm (+1/16") shall be mechanically fastened.

C. Ventilation and Drainage: Direct water leakage to exterior by means of concealed drainage system and weeps. Flashings and other materials used internally shall be nonstaining, noncorrosive, and nonbleeding.

D. Protection and Treatment of Metals:
1. Remove from metal surfaces lubricants used in fabrication and clean off other extraneous material before leaving shop.
2. Provide protection against galvanic action wherever dissimilar metals are in contact, except in case of aluminum in permanent contact with galvanized steel, zinc, stainless steel, or relatively small areas of white bronze. Paint contact surfaces with one coat bituminous paint conforming to MIL-C-18480 or apply appropriate caulking material or

nonabsorptive, noncorrosive, and nonstaining tape or gasket between contact surfaces.

E. Metal sills and Closures: Fabricate accessories, spandrel panels, trim closures of sizes and shapes indicated from similar materials and finish as specified for wall system.

2.4 PROTECTION

A. Provide protection for aluminum against galvanic action, wherever dissimilar materials are in contact, by painting contact surfaces of dissimilar material with a heavy coat of bituminous paint (complete coverage), or by separating contact surfaces with a preformed neoprene tape having pressure sensitive adhesive coating on one side.

2.5 METAL FINISHES

A. In accordance with NAAMM AMP500 series.

B. Anodized Aluminum:

1. AA-C22A41 Chemically etched medium matte, with clear anodic coating, Class 1 Architectural, 0.7-mil thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Prior to installation of glazed curtain wall system, arrange for representative(s) of manufacturer to examine structure and substrate to determine that they are properly prepared, and ready to receive glazed curtain wall work included herein.

B. Verifying Conditions and Adjacent Surfaces: After establishment of lines and grades and prior to system installation examine supporting structural elements. Verify governing dimensions, including floor elevations, floor to floor heights, minimum clearances between curtain wall and structural frames, and other permissible dimensional tolerances in building frame.

3.2 PREPARATION

A. Take field dimensions and examine condition of substrates, supports, and other conditions under which work of this section is to be performed to verify that work may properly commence. Do not proceed with installation until unsatisfactory conditions have been corrected.

B. Contact between aluminum and dissimilar metals shall receive a protective coating of asphaltic paint for prevention of electrolytic action and corrosion.

3.3 INSTALLATION

A. Installation and erection of glazed curtain wall system and all components shall be in accordance with written directions of curtain

wall manufacturer. Match profiles, sizes, and spacing indicated on approved shop drawings.

B. Bench Marks and Reference Points: Establish and permanently mark bench marks for elevations and building line offsets for alignment at convenient points on each floor level. Should any error or discrepancy be discovered in location of marks, stop erection work in that area until discrepancies have been corrected.

C. Ensure that drainage system operates properly in accord with AAMA 501 procedures.

D. Do not proceed with structural silicone work when metal temperature is below 0 degrees C (32 degrees F).

E. Isolate between aluminum and dissimilar metals with protective coating or plastic strip to prevent electrolytic corrosion.

F. Install glazed aluminum curtain wall system so as to maintain a virtually flat face cap, with no visible bowing.

G. Install entire system so that fasteners are not visible.

H. Tolerances:

1. Maximum variation from plane or location shown on approved shop drawings: 3 mm per 3600 mm (1/8 inch per 12 feet) of length up to not more than 13 mm (1/2 inch) in any total length.
2. Maximum offset from true alignment between two identical members abutting end to end in line: 0.8 mm (1/32 inch).
3. Sealant Space Between Curtain Wall Mullion and Adjacent Construction: Maximum of 19 mm (3/4 inch) and minimum of 6 mm (1/4 inch).

I. Windows:

1. Refer to Section 08 51 13, ALUMINUM WINDOWS for window requirements.
2. Install windows in accordance with details indicated and approved shop drawing detail drawings.
3. Seal exterior metal to metal joints between members of windows, frames, mullions, and mullion covers in accordance with requirements of Section 07 92 00, JOINT SEALANTS. Remove excess sealant.

J. Joint Sealants:

1. Joint Sealants: Shall be in accordance with requirements of Section 07 92 00, JOINT SEALANTS.
2. Surfaces to be primed and sealed shall be clean, dry to touch, free from frost, moisture, grease, oil, wax, lacquer, paint, or other foreign matter. Enclose joints on three sides. Clean out grooves to proper depth. Joint dimensions shall conform to approved detail drawings with a tolerance of plus 3 mm (1/8 inch). Do not apply compound unless ambient temperature is between 5 and 35 degrees C (40

and 90 degrees F). Clean out loose particles and mortar just before sealing. Remove protective coatings or coverings from surfaces in contact with sealants before applying sealants or tapes. Solvents used to remove coatings shall be of type that leave no residue on metals.

3. Match approved sample. Force compound into grooves with sufficient pressure to fill grooves solidly. Sealing compound shall be uniformly smooth and free of wrinkles and, unless indicated otherwise, shall be tooled and left sufficiently convex to result in a flush joint when dry. Do not trim edges of sealing material after joints are tooled. Mix only amount of multi-component sealant which can be installed within four hours, but at no time shall this amount exceed 19 liters (5 gallons).
4. Apply primer to masonry, concrete, wood, and other surfaces as recommended by sealant manufacturer. Do not apply primer to surfaces which will be exposed after caulking is completed.
5. Tightly pack backing in bottom of joints which are over 13 mm (1/2 inch) in depth with specified backing material to depth indicated or specified. Roll backing material of hose or rod stock into joints to prevent lengthwise stretching.
6. Install bond preventive material at back or bottom of joint cavities in which no backstop material is required, covering full width and length of joint cavities.
7. Remove compound smears from surfaces of materials adjacent to sealed joints as work progresses. Use masking tape on each side of joint where texture of adjacent material will be difficult to clean. Remove masking tape immediately after filling joint. Scrape off fresh compound from adjacent surfaces immediately and rub clean with approved solvent. Upon completion of caulking and sealing, remove remaining smears, stains, and other soiling, and leave work in clean neat condition.

K. Glass:

1. Refer to Section 08 80 00, GLAZING, and drawing for glass types. Install in accordance with manufacturer's recommendations as modified herein.
2. Before installing glass, inspect sash and frames to receive glass for defects such as dimensional variations, glass clearances, open joints, or other conditions that will prevent satisfactory glass installation. Do not proceed with installation until defects have been corrected.

3. Clean sealing surfaces at perimeter of glass and sealing surfaces of rebates and stop beads before applying glazing compound, sealing compound, glazing tape, or gaskets. Use only approved solvents and cleaning agents recommended by compound or gasket manufacturer. All sashes shall be designed for outside glazing. Provide continuous snap in glazing beads to suit glass as specified.
4. Insulating and tempered glass, and glass of other types that exceed 100 united inches in size: Provide void space at head and jamb to allow glass to expand or move without exuding sealant. Perimeter frames and ventilator sections shall have glazing rebates providing an unobstructed glazing surface 19 mm (3/4 inch) in height. Glazing rebate surfaces must be sloped to shed water.
5. Provide adequate means to weep incidental water and condensation away from sealed edges of insulated glass units and out of wall system. Weeping of lock-strip gaskets should be in accordance with recommendation of glass manufacturer.

L. Metal Copings:
1. Refer to Section 07 60 00, FLASHING AND SHEET METAL for requirements of metal copings when they are not a part of glazed curtain wall system work.
2. Coordinate curtain wall installation with metal coping detail on contract drawings. Provide watertight seal to meet criteria set forth in this section regarding air and water penetration.

3.4 ADJUSTING

A. Windows doors to provide a tight fit at contact points and operate easily.

3.5 CLEANING

A. Install curtain wall frame and associated metal to avoid soiling or smudging finish.
B. Clean metal surfaces promptly after installation, exercising care to avoid damage to coatings.
C. Remove excess glazing and sealant compounds, dirt, and other substances.
D. Follow recommendations of manufacturer in selection of cleaning agents. Do not use cleaning agents containing ammonia or other compounds that might damage finished metal surfaces.
E. Replace cracked, broken, and defective glass with new glass at no additional cost to Government. Just prior to final acceptance of curtain wall system clean glass surfaces on both sides, remove labels, paint spots, compounds, and other defacements, and clean metal fixed panels. Remove and replace components that cannot be cleaned successfully.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Engage an AAMA accredited commercial qualified independent testing and inspecting agency to perform field quality-control tests specified, and to prepare test reports: Submit information regarding testing laboratory's facilities and qualifications of technical personnel to Contracting Officer for approval.

B. Conduct field check test for water leakage on designated wall areas after erection to comply with MCWM-1. Conduct test on two wall areas, two bays wide by two stories high where directed. Conduct test and take necessary remedial action as directed by Contracting Officer.

C. Test Specimen:
   1. Test specimen shall include curtain wall assembly and construction. Test chamber shall be affixed to exterior side of test specimen and test shall be conducted using positive static air pressure.
   2. Test specimens shall be selected by Contracting Officer after curtain wall system has been installed in accordance with contract drawings and specification.

D. Sealant Adhesion Tests: Test installed sealant, in presence of sealant manufacturer’s field representative, in a minimum of two areas and as follows:
   1. Test structural silicone sealant according to field adhesion test method described in AAMA CW 13, "Structural Sealant Glazing Systems (A Design Guide)."
   2. Test weatherseal sealant as recommended in writing by sealant manufacturer.

E. Air Infiltration: Test glazed aluminum curtain wall system according to AAMA 503, which requires testing according to ASTM E783.
   1. Field air leakage testing is not required for continuous curtain wall systems.
   2. Static-Air-Pressure Differential: 75 Pa (1.57 lbf/sq. ft.) minimum.
   3. Air Leakage: 0.03 L/s per sq. m (0.06 cfm/sq. ft.) of surface maximum.

F. Water Penetration: Test glazed aluminum curtain wall system for compliance with requirements according to AAMA 503, which requires testing according to ASTM E1105.
   1. Uniform Static-Air-Pressure Difference: 20 percent of positive design wind load, but not less than 479 Pa (10 psf). No uncontrolled water shall be present.

G. Retesting:
   1. Should system fail field test, system may be modified or repaired, and retested.
   2. Should system fail second field test, system may be additionally modified or repaired, and retested.
   3. All modifications and repairs made to tested areas shall be recorded, and same modifications and repairs made to all system and adjacent construction on project.
   4. Should second test fail, Contracting Officer may require testing of additional areas of the curtain wall.

H. Rejection:
   1. Failure of any of specimens to meet test requirements of third test shall be cause for rejection of wall system and adjacent construction on project.

3.7 DEMONSTRATION, TESTING, AND ACCEPTANCE

A. Instruct Owner's personnel in proper operation and maintenance of windows. Train personnel in procedures to follow in event of operational failures or malfunctions.

B. Acceptance: At completion of project, and as a condition of acceptance.

3.8 PROTECTION

A. After installation, protect windows, and other exposed surfaces from disfiguration, contamination, contact with harmful materials, and from other construction hazards that will interfere with their operation, or damage their appearance or finish. Protection methods shall be in accordance with recommendations of product manufacturers or of respective trade association. Remove paper or tape factory applied protection immediately after installation. Clean surfaces of mortar, plaster, paint, smears of sealants, and other foreign matter to present neat appearance and prevent fouling of operation. In addition, wash with a stiff fiber brush, soap and water, and thoroughly rinse. Where surfaces become stained or discolored, clean or restore finish in accordance with recommendations of product manufacturer or respective trade association.

- - - END - - -

SECTION 08 51 13
ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Aluminum windows of type and size shown, complete with hardware, related components and accessories.

B. Types:

1. Fixed

1.2 DEFINITIONS

A. Accessories: Mullions, staff beads, casings, closures, trim, moldings, panning systems, sub-sills, clips anchors, fasteners, weather-stripping, insect screens and other necessary components required for fabrication and installation of window units.

B. Uncontrolled Water: Water not drained to the exterior, or water appearing on the room side of the window.

1.3 RELATED WORK

A. Steel subframes: Section 05 50 00, METAL FABRICATIONS.

B. Precast Architectural Concrete Sills: Section 03 45 00, PRECAST ARCHITECTURAL CONCRETE.

C. Storefront: Section 08 41 13, ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS.

D. Glazing: Section 08 80 00, GLAZING.

E. Masonry Facing: Section 04 20 00, UNIT MASONRY.

F. Color of finish: Section 09 06 00, SCHEDULE FOR FINISHES.

G. Blast Loading and Design Requirements: Section 08 56 53, BLAST RESISTANT WINDOWS.

1.4 DELIVERY, STORAGE AND HANDLING

A. Protect windows from damage during handling and construction operations before, during and after installation.

B. Store windows under cover, setting upright.

C. Do not stack windows flat.

D. Do not lay building materials or equipment on windows.

1.5 QUALITY ASSURANCE

A. Approval by contracting officer is required of products or service of proposed manufacturers and installers.

B. Approval will be based on submission of certification by Contractor that:

1. Manufacturer regularly and presently manufactures the specified windows as one of its principal products.
2. Installer has technical qualifications, experience, trained personnel and facilities to install specified items.

C. Provide each type of window produced from one source of manufacture.

D. Quality Certified Labels or certificate:

1. Architectural Aluminum Manufacturers Association, "AAMA label" affixed to each window indicating compliance with specification.
2. Certificates in lieu of label with copy of recent test report (not more than 4 years old) from an independent testing laboratory and certificate signed by window manufacturer stating that windows provided comply with specified requirements and AAMA 101/I.S.2 for type of window specified.

1.6 SUBMITTAL

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings:

1. Minimum of 1/2 full scale all types of windows on project.
2. Identifying parts of window units by name and kind of metal or material, show construction, locking systems, mechanical operators, trim, installation and anchorages.
3. Include glazing details and standards for factory glazed units.

C. Manufacturer's Literature and Data:

1. Window.
2. Sash locks, keepers, and key.

D. Certificates:

1. Certificates as specified in paragraph QUALITY ASSURANCE.
2. Indicating manufacturers and installers qualifications.
3. Manufacturer's Certification that windows delivered to project are identical to windows tested.

E. Test Reports:

1. Copies of test reports as specified in paragraph QUALITY ASSURANCE.

F. LEED Information:

1. LEED Credit MR 4.1 and MR 4.2, Recycled Content: Product data indicting percentages, by weight of post-consumer and post-industrial recycled content for products having recycled content.
   a. Include statement indicating costs for each product having recycled content.

2. LEED Credit MR 5.1 and MR 5.2, Materials Extracted, Processed and Manufactured Regionally: Manufacturer’s data identifying point of origin for products procured within a 500 mile radius of the project.
   a. Include statement indicating costs for each product submitted.

1.7 WARRANTY

A. Warrant windows against malfunctions due to defects in thermal breaks, hardware, materials and workmanship, subject to the terms of Article “WARRANTY OF CONSTRUCTION”, FAR clause 52.246-21, except provide 10 year warranty period.

1.8 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.

B. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)

90.1-04.....Energy Standard of Buildings

C. American Architectural Manufacturers Association (AAMA):

101/I.S.2/A440-05.....Windows, Doors, and Unit Skylights

505-98.....Dry Shrinkage and Composite Performance Thermal Cycling Test Procedures

2605-05.....Superior Performing Organic Coatings on Architectural Aluminum Extrusions and Panels

TIR-A8-04.....Structural Performance of Poured and Debridged Framing Systems

D. American Society for Testing and Materials (ASTM):

A653/A653M-07.....Steel Sheet, Zinc Coated (Galvanized), Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-dip Process

E 90-04.....Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions

E. National Fenestration Rating Council (NFRC):

NFRC 100-04.....Determining Fenestration Product U-Factors

NFRC 200-04.....Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence

F. National Association of Architectural Metal Manufacturers (NAAMM):
AMP 500 Series.....Metal Finishes Manual

PART 2- PRODUCTS

2.1 MATERIALS

A. Aluminum Extrusions; Sheet and Plate: AAMA 101/I.S.2.

B. Sheet Steel, Galvanized: ASTM A653; G90 galvanized coating.

C. Weather-strips: AAMA 101/I.S.2; except leaf type weather-stripping is not permitted.

D. Fasteners: AAMA 101/I.S.2. Screws, bolts, nuts, rivets and other fastening devices to be non-magnetic stainless steel.

1. Fasteners to be concealed. Where wall thickness is less than 3 mm (0.125 inch) thick, provide backup plates or similar reinforcements for fasteners.
2. Stainless steel self tapping screws may be used to secure Venetian blind hanger clips, vent guide blocks and friction adjuster.

2.2 THERMAL AND CONDENSATION PERFORMANCE

A. Condensation Resistance Factor (CRF): Minimum CRF of punched windows.

1. 59 Frame.
2. 69 Glass.

B. Thermal Transmittance:

1. Maximum U value class for insulating glass windows: 50 (U=0.50).
2. Maximum U value class for dual glazed windows: 70 (U=0.70), or as required by ASHRAE 90.1.

C. Solar Heat Gain Coefficient (SHGC): SHGC shall comply with State or local energy code requirement.

2.3 FABRICATION

A. Fabrication to exceed or meet requirements of Physical Load Tests, Air Infiltration Test, and Water Resistance Test of AAMA 101/I.S.2.

B. Glazing:

1. Factory or field glazing optional.
2. Glaze in accordance with Section 08 80 00, GLAZING.
3. Windows reglazable without dismantling sash framing.
4. Design rabbet to suit glass thickness and glazing method specified.
5. Glaze from interior except where not accessible.
6. Provide removable fin type glazing beads.

C. Trim:

1. Trim includes casings and panning.

2. Fabricate to shapes shown of aluminum not less than 1.6 mm (0.062 inch) thick
3. Extruded or formed sections, straight, true, and smooth on exposed surfaces.
4. Exposed external corners mitered and internal corners coped; fitted with hairline joints.
5. Reinforce 1.6 mm (0.062 inch) thick members with not less than 3 mm (1/8-inch) thick aluminum.
6. Except for strap anchors, provide reinforcing for fastening near ends and at intervals not more than 305 mm (12 inches) between ends.
7. Design to allow unrestricted expansion and contraction of members and window frames.
8. Secure to window frames with machine screws or expansion rivets.
9. Exposed screws, fasteners or pop rivets are not acceptable on exterior of the casing or trim cover system.

D. Thermal-Break Construction:
1. Manufacturer’s Standard.
2. Low conductance thermal barrier.
3. Capable of structurally holding sash in position and together.
4. All Thermal Break Assemblies (Pour & Debridge, Insulbar or others) shall be tested as per AAMA TIR A8 and AAMA 505 for Dry Shrinkage and Composite Performance.
5. Location of thermal barrier and design of window shall be such that, in closed position, outside air shall not come in direct contact with interior frame of the window.

E. Mullions: AAMA 101.

F. Subsills and Stools:
1. Fabricate to shapes shown of not less than 2 mm (0.080 inch) thick extruded aluminum.
2. One piece full length of opening with concealed anchors.
3. Sills turned up back edge not less than 6 mm (1/4 inch). Front edge provide with drip.
4. Sill back edge behind face of window frame. Do not extend to interior surface or bridge thermal breaks.
5. Do not perforate for anchorage, clip screws, or other requirements.

2.4 FIXED WINDOWS

A. AAMA certified product to the AAMA 101/I.S.2. - 97 standard.

B. Comply with AAMA 101 performance tests in high wind areas caused by helicopter traffic. Coordinate with heliport consultant for design pressure.

2.5 FINISH

A. In accordance with NAAMM AMP 500 series.

B. Finish exposed aluminum surfaces as follows:

1. Anodized Aluminum:

a. Finish in accordance with AMP 501 letters and numbers.

b. Clear anodized Finish: AA-C22A41 Medium matte, clear anodic coating, Class 1 Architectural, 0.7 mils thick.

PART 3 - EXECUTION

3.1 PROTECTION (DISSIMILAR MATERIALS)

A. AAMA 101/I.S.2.

3.2 INSTALLATION, GENERAL

A. Install window units in accordance with manufacturer's specifications and recommendations for installation of window units and other components of work.

B. Where type, size or spacing of fastenings for securing window accessories or equipment to building construction is not shown or specified, use expansion or toggle bolts or screws, as best suited to construction material.

1. Provide bolts or screws minimum 6 mm (1/4-inch) in diameter.
2. Sized and spaced to resist the tensile and shear loads imposed.
3. Do not use exposed fasteners on exterior, except when unavoidable for application of hardware.
4. Provide non-magnetic stainless steel Phillips flat-head machine screws for exposed fasteners, where required, or special tamper-proof fasteners.
5. Locate fasteners to not disturb the thermal break construction of windows.

C. Set windows plumb, level, true, and in alignment; without warp or rack of frames or sash.

D. Anchor windows on four sides with anchor clips or fin trim.

1. Do not allow anchor clips to bridge thermal breaks.
2. Use separate clips for each side of thermal breaks.
3. Make connections to allow for thermal and other movements.
4. Do not allow building load to bear on windows.

5. Use manufacturer's standard clips at corners and not over 600 mm (24 inches) on center.
6. Where fin trim anchorage is shown build into adjacent construction, anchoring at corners and not over 600 mm (24 inches) on center.

E. Sills and Stools:
1. Set in bed of mortar or other compound to fully support, true to line shown.
2. Do not extend sill to inside window surface or past thermal break.
3. Leave space for sealants at ends and to window frame unless shown otherwise.

3.3 MULLIONS, TRIM AND PANNING

A. Cut mullion full height of opening and anchor directly to window frame on each side.
B. Closures, Trim, and Panning: External corners mitered and internal corners coped, fitted with hairline, tightly closed joints.
C. Secure to concrete or solid masonry with expansion bolts, expansion rivets, split shank drive bolts, or powder actuated drive pins.
D. Toggle bolt to hollow masonry units. Screwed to wood or metal.
E. Fasten except for strap anchors, near ends and corners and at intervals not more than 300 mm (12 inches) between.
F. Seal units following installation to provide weathertight system.

3.4 ADJUST AND CLEAN

A. Adjust ventilating sash and hardware to provide tight fit at contact points, and at weather-stripping for smooth operation and weathertight closure.
B. Clean aluminum surfaces promptly after installation of windows, exercising care to avoid damage to protective coatings and finishes.
C. Remove excess glazing and sealant compounds, dirt, and other substances.
D. Lubricate hardware and moving parts.
E. Clean glass promptly after installation of windows. Remove glazing and sealant compound, dirt and other substances.
F. Except when a window is being adjusted or tested, keep locked in the closed position during the progress of work on the project.

3.5 GLAZING SCHEDULE

GLASS	OUTER	CAVITY	INNER	PERFORMANCE	MANUFACTURER
GL-1 Floor: Ground & First	1/4″ Clear H.S. Low-E #2 Surface	1/2" sealed air space	7/16″ H.S. laminated, 0.030″ PVB interlayer	Visible Light Transmittance: 57% Solar Energy Transmittance: 27% U-V Transmittance: <1% Visible Light Reflectance Exterior: 15% Visible Light Reflectance Interior: 14% Solar Energy reflectance: 9% Winter Nighttime U-Value: 0.33 Summer Daytime U-Value: 0.25 Shading Coefficient: 0.49 Solar Heat Gain Coefficient: 0.43	VIRACON
GL-3 Stairway	1/4″ Clear Tempered Low-E #2 Surface	1/2″ sealed air space	7/16″ H.S. laminated, 0.030″ PVB interlayer		
GL-4 Bridge	1/4″ Clear H.S. Low-E #2 Surface	1/2″ sealed air space	1/4″ Clear H.S.		

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SECTION 08 56 53
BLAST RESISTANT WINDOWS

PART 1 - GENERAL

1.1 DESCRIPTION

A. The extent of exterior metal window units required to provide specified resistances is indicated on Contract Drawings by elevations.

1.2 RELATED DOCUMENTS

A. Glazing and ballistic rated glazing: Section 08 80 00, GLAZING.

B. Physical Security Design Manual (PSDM) July 2007, for Veteran Affair Life Safety Facilities, Final Draft.

C. WinGARD Version 5.5 or later.

1.3 SYSTEM PERFORMANCE

A. General: Fabricate and install window assemblies to achieve indicated levels of resistance. Extend resistance to include anchorages, interfaces with adjoining substrates, glass retention, and hardware. Security attacks shall be unable to penetrate through closed/locked security window assemblies in manner described; it is recognized that such attacks may damage units beyond repair and reuse, requiring replacement.

1. Forced-Entry (FE) resistant assemblies: Where window assembly is shown or scheduled as FE, provide window manufacturer's material and fabrication for panels, inserts, hardware, devices, and framing of units. Provide rated units where shown or scheduled
2. Ballistic Resistant (BR) assemblies: Where assembly is shown or scheduled as BR, provide manufacturer's materials and fabrication for panel, inserts, and framing of unit. Provide rated units where shown or scheduled.
3. Provide combined performances for indicated requirements, with each performance surviving combined attacks within rating limitations of performance, but recognizing that certain forms of attack may result in severe damage to units, even though repelled successfully, leading to need for replacement of units, or of damaged elements of units.

B. Blast Resistance: Provide resistance as follows:

1. General:
   a. Design exterior windows and frames to meet the performance requirements for a ‘Life Safety’ facility in accordance with the PSDM.

b. Window systems must meet the principles of balanced design (i.e. glass fails first).

c. Glazed doors shall be designed such that they seat within a continuous door stop, which is mechanically attached to a door frame. Doors may fail outward in response to blast loading and hardware (i.e. hinges and locks) may fail. Mullions and structure serving to support doors shall be designed for blast loading.

2. Acceptable Glass Response:

a. Blast Resistant Window Systems: windows and glazed doors are to meet the equivalent of GSA Performance Condition 3B or better. Condition 3B is defined as the glazing breaks, glass fragments enter space and land on floor no further than 10 feet (3 meters) from the window.

3. Window System Design:

a. Glass Design: Use WinGARD 5.5 or latest to design exterior glass panes (with the exception of skylight panes) to resist peak pressure, Pr = 4 psi, and the corresponding impulse, Ir = 28 psi-msec.

b. Glass Capacity: Determine the maximum capacity dynamic loading for a performance condition level 2. Condition 2 is defined as the glazing cracks but remains in the frame.

C. Supporting Structure: Design framing members and mullions to the glass capacity of the largest lite of glass tributary to the mullion applied over the appropriate effective area of the mullion.

1. Support Rotation: Provide a support rotation of the glazing pocket of up to 3° and mullions of up to L/30. Analysis must show that glazing will not disengage from the window framing system when mullion rotations exceed 2° or provide a minimum ¼-in. of structural silicone sealant in accordance with this specification.

D. Connections: Design connections to the lesser of the following:

1. Design connections to the average peak dynamic loads from the glazing by distributing the dynamic loads over the perimeter length of the frame or the ultimate resistance of the glass panes over the appropriate tributary area, whichever is greater.

2. Sum all mullion reaction forces framing into a connection join based on each element’s flexural yield capacity.

E. Connection Safety Factors (SF):

1. SF = 1 shall be allowed for connection elements that provide a ductile mode of failure (e.g. bolt bearing, tensile yielding, etc.)
2. SF = 1.5 shall be used for connection elements that provide a non-ductile mode of failure (e.g. weld fracture, concrete cone failure due to anchor bolt pull-out, etc.)
3. Connection assembly may be designed for the lesser of a SF = 1.5 or the strength of the actual failure mechanism in the assembly, provided it is governed by a ductile mode.

F. Spandrel Panels: Analysis should be performed to determine the response of the spandrel glass, panels and/or the back-up wall system. Performance should focus on the limitation of flying debris into occupied space.
1. Glass: Laminated meeting a Performance Condition Level 3B or better.
2. Metal Panel: Metal panels backing up the spandrel glass are to be designed for:
a. Ductility: $\mu \leq 20$
b. Support Rotation: L/30 degrees
c. Connections: Develop capacity of the metal panels

G. Exterior Appendages: Exterior appendages to the window system (i.e. Sun and Wind Screens) are to be designed for:
1. Ductility: $\mu \leq 3$
2. Support Rotation: L/30 degrees
3. Connections: Develop capacity of the metal panels

1.4 SUBMITTALS

A. General: Submit the following in accordance with Section 01 33 23, SHOP DRAWINGS.
1. Shop drawings showing dimensioned details of metal window units. Show application of intended glazing materials. Show typical window unit interior and exterior elevations at not less than ¾"=1'-0" (1:20) scale. Indicate how window units, not necessarily including basic sub-frames, are to be subsequently removed/replaced; and how glazing unit removal/replacement is to be accomplished. After final modifications and corrections have been incorporated, submit drawings as AutoCAD files with .DWG extension:
a. Details: Show sections at 3"=1'-0" (1:5) scale of members indicating construction, size, and thickness of components, together with connections, fastenings, and means of separating dissimilar metals.

B. Calculations: Provide calculations prepared by qualified blast consultant verifying that window and glazing meet specific blast resistance requirements detailed in this Section.

1. Prior to performing engineering calculations intended to address the blast loading identified, submit a description of the technique(s) that will be employed to calculate the response of the system to the defined dynamic loading.
2. Calculation package is to include a summary sheet briefly outlining the following:
   a. Evaluation criteria
   b. Calculation assumptions
   c. Table of results by window type/location
   d. Statement of Conformance with specification requirements.
3. Calculation submittal is to be stamped and signed by a registered Professional Engineer whose qualifications meet or exceed Quality Assurance criteria.
4. Submit single degree of freedom (or better) dynamic analysis for window system. Submit engineering calculations to show that window response meets specified performance requirements under design load. Additionally, illustrate that brittle modes of failure (such as shear and buckling) are avoided. These calculations must include, but may not be limited to, analysis of the following:
   a. Glass. Determine glass pane performance using an analysis program such as WinGard (Version 5.5 or later), developed by the General Service Administration. If a program other than WinGard is used, it must be approved by the Owner prior to calculations. WinGard calculations provided in the calculation package are to include the complete text rather than the “concise” text printout.
   b. Mullions and framing members. Provide a clear load path from the glass to the primary element and supporting analysis which illustrates each component’s ability to transfer the design load to the primary element. Analysis of primary element shall illustrate flexural and shear capacity. Analysis will include verification that the structural silicone sealant can hold the glass in the frame under design loads.
   c. Anchorage. Analyze the strength of embedded anchor assembly, as well as pull-out and reaction forces shared with the building

structure. Analyze the window wall anchor clip inserts and fasteners and assemblies, including bolts and stiffeners. Include exact loadings to be transferred to the building structure in the analysis.

d. Mechanical Anchors. Mechanical anchor capacities shall be developed from dynamic testing. An International Code Council (ICC-ES) evaluation report showing testing for dynamic loading (i.e. seismic or blast) is to be submitted with calculations.

e. Supporting structure. Coordination of the window/supporting structure interaction shall be the contractors' responsibility. The window contractor's engineer performing blast calculations for the window system shall coordinate loading scenarios with the cladding contractor's engineer providing design for the exterior cladding system. Forces transmitted from the appropriate window tributary area shall be the maximum capacity or design loads, whichever is greater, from the glazing area.

5. Analysis is required to verify its ability to develop its plastic capacity without instability. Additional calculations must include, but may not be limited to, analysis of the following:

a. Global performance of mullion. Analysis shall verify that the plastic moment of the mullion, acting in a composite manner with its individual components, can be attained under maximum calculated deflections. Fasteners between each component shall be designed for the plastic capacity of the mullion.

b. Lateral torsional buckling. Analysis shall verify the ability of the mullion to provide adequate resistance against lateral torsional buckling under maximum calculated deflections.

c. Local buckling. Analysis shall verify the ability of the mullion and its individual components and connections to provide adequate resistance against localized buckling along the entire load path under maximum calculated deflections.

d. Structural silicone stress. Analysis shall verify the capacity of the silicone to retain the glass under maximum calculated deflections.

1.5 QUALITY ASSURANCE

A. Provide products that meet the requirements of Physical Security Design Manual (PSDM) July 2007, for Veteran Affair Mission Critical Facilities, Final Draft.

B. Engineer: Engage an Engineering Professional to perform dynamic analysis of the Blast Resistant Windows. The Engineer shall have a minimum of 5 years experience performing dynamic analysis for blast resistant design and demonstrable experience designing blast resistant window systems in the past 18 months.

C. Window Bite: The required window system bite must be verified in the field.

D. Installation Orientation: Windows delivered to the construction site are to be clearly labeled as to the proper installation orientation (i.e. laminated pane of glass to be installed as the interior pane.)

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with Manufacturer's directions and as required to prevent edge damage or other damage to assembly resulting from effects of moisture, condensation, temperature changes, direct exposure to sun, and contact with chemical solvents.

B. Deliver prefabricated units to Project as completely assembled units, ready for anchorage into supporting structure, and for interfacing with other work.

1.7 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. American Society for Testing and Materials (ASTM):

ASTM A36/A36M-05.....Standard Specification for Carbon Structural Steel

ASTM A123/A123M-02.....Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

ASTM A320/A320M-07.....Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for Low-Temperature Service

ASTM B221-06.....Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes

C. National Association of Architectural Metal Manufactures (NAAMM)

AMP 500-505-88.....Metal Finishes Manual

D. Physical Security Design Manual (PSDM) July 2007, for Veteran Affair Mission Critical Facilities, Final Draft.

E. WinGARD Version 5.5 or latest

PART 2 - PRODUCTS

2.1 MANUFACTURER/FABRICATOR

A. Certified Units: Provide units and sub-frames which are manufactured/fabricated by firms which have produced identical units required for this Project and which have been certified to comply with requirements for levels of resistance to attack specified.

2.2 MATERIALS

A. Steel Shapes/Plates/Bars: ASTM A 36, except where another designation is indicated.

B. Stainless Steel: Provide formed members of AISI Type 304 stainless steel sheet, with No. 4 directional polish.

C. Bolts and Fasteners: Provide AISI Type 300-series stainless steel screws, bolts, nuts, and washers; comply with ASTM A 320. Provide non-removable type where accessible from attack side.

D. Aluminum Extrusions/Bars: Provide members complying with ASTM B 221, alloy 6063-T5, -T6, or -T52, or alloy 6061-T6, for principal framing members, with 3/16 inch (4.76 mm) minimum thickness of walls; provide alloy 6063-T5, -T6, or -T52 for trim and stops which are not exposed to forced entry attack, of 1/16 inch (1.575 mm) minimum thickness.

E. Window Cleaner's Bolts: Provide units of standard design as indicated, complying with applicable safety regulations, fabricated of nonmagnetic stainless steel.

F. Framing Members:

1. Yield Strength: Provide supporting references that grade of steel or aluminum used is capable of achieving calculated ductility ratio.
2. The yield strength of framing members may be increased to account for dynamic strain rate effects as follows:
   a. Structural Steel: For fy = 36 ksi, the yield strength may be increased by a factor of 1.42. For fy = 46 ksi, the yield strength may be increased by a factor of 1.31.
   b. Structural Aluminum: The yield strength may be increased by a factor of 1.02.
3. Section Modulus: The plastic section modulus may be used in dynamic design calculations.
4. Built-up Sections: Design built-up sections using ultimate stress and strain compatibility approaches as defined by industry standards. If built-up section is analyzed as one unit, full shear

stress transfer along the line of contact between the individual sections must be illustrated.

G. Glazing Materials: Refer to Section 08 80 00.

1. Glass-to-Glass Interlayers: Clear polyvinyl butyrl (PVB) laminating film/sheet shall be used on the inner lite of exterior window systems.
2. Window bite: The minimum allowable bite is ½" [12.7 mm].
3. Probability of Failure. To determine the response of the glass and the anchorage loads, the probability of breakage for the glass is to be 750 breaks per 1000.

H. Structural Silicone Sealant:

1. Ultimate Tensile Stress: Minimum 350 psi in tension.
2. Safety Factors: ultimate tension and shear capacities are to be used with a safety factor of 1.0.
3. Apply the silicone sealant to the interior perimeter of the glass to bond the glass to the frame. The minimum bead size is ¼" [6 mm].

PART 3 - EXECUTION (NOT USED)

- - - E N D - - -

SECTION 08 71 00
DOOR HARDWARE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Door hardware and related items necessary for complete installation and operation of doors.

1.2 RELATED WORK

A. Section 01 81 13, SUSTAINABLE DESIGN REQUIREMENTS for additional LEED requirements.

B. Section 01 81 19, INDOOR AIR QUALITY REQUIREMENTS for VOC limit.

C. Caulking: Section 07 92 00 JOINT SEALANTS.

D. Application of Hardware: Section 08 14 00, WOOD DOORS; Section 08 11 13, HOLLOW METAL DOORS AND FRAMES; Section 08 41 13, ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS; Section 08 33 00, COILING DOORS; Section 08 71 13, AUTOMATIC DOOR OPERATORS.

E. Finishes: Section 09 06 00, SCHEDULE FOR FINISHES.

F. Painting: Section 09 91 00, PAINTING.

G. Card Readers: Section 28 05 33, WIRING FOR CARD READERS AND ELECTRONIC DEVICES.

1. Provided by Government under a separate contract.

1.3 GENERAL

A. All hardware shall comply with UFAS, (Uniform Federal Accessible Standards) unless specified otherwise.

B. Hardware for Labeled Fire Doors and Exit Doors: Conform to requirements of NFPA 80 for labeled fire doors and to NFPA 101 for exit doors, as well as to other requirements specified. Provide hardware listed by UL, except where heavier materials, large size, or better grades are specified herein under paragraph HARDWARE SETS. In lieu of UL labeling and listing, test reports from a nationally recognized testing agency may be submitted showing that hardware has been tested in accordance with UL test methods and that it conforms to NFPA requirements.

C. Hardware for application on metal and wood doors and frames shall be made to standard templates. Furnish templates to the fabricator of these items in sufficient time so as not to delay the construction.

D. The following items shall be of the same manufacturer, if possible, except as otherwise specified:

1. Mortise locksets.

2. Hinges for hollow metal and wood doors.

3. Surface applied overhead door closers.
4. Exit devices.
5. Floor closers.

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

B. Hardware Schedule: Prepare and submit hardware schedule in the following form:

Hardware Item	Quantity	Size	Reference Publication Type No.	Finish	Mfr. Name and Catalog No.	Key Control Symbols	UL Mark (if fire rated and listed)	ANSI/BHMA Finish Designation

C. Samples and Manufacturers' Literature:
1. Samples: All hardware items (proposed for the project) that have not been previously approved by Builders Hardware Manufacturers Association shall be submitted for approval. Tag and mark all items with manufacturer's name, catalog number and project number.
2. Samples are not required for hardware listed in the specifications by manufacturer's catalog number if the contractor proposes to use the manufacturer's product specified.

D. Certificate of Compliance and Test Reports: Submit certificates that hardware conforms to the requirements specified herein. Certificates shall be accompanied by copies of reports as referenced. The testing shall have been conducted either in the manufacturer's plant and certified by an independent testing laboratory or conducted in an independent laboratory, within four years of submittal of reports for approval.

E. LEED Information:
1. Credits MR 4.1 & 4.2: For products having recycled content, documentation indicating percentages by weight of post-consumer and pre-consumer recycled content.
   a. Include statement indicating costs for each product containing recycled content.

2. Credits MR 5.1 & 5.2: For products manufactured within 500 miles of project site *and* whose raw materials are extracted, harvested or recovered, within 500 miles of the project site, documentation indicating the location and distance of material manufacturer and point of extraction, harvest, or recovery for each raw material from the Project site.
   a. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.5 DELIVERY AND MARKING

A. Deliver items of hardware to job site in their original containers, complete with necessary appurtenances including screws, keys, and instructions. Tag one of each different item of hardware and deliver to Resident Engineer for reference purposes. Tag shall identify items by Project Specification number and manufacturer's catalog number. These items shall remain on file in Resident Engineer's office until all other similar items have been installed in project, at which time the Resident Engineer will deliver items on file to Contractor for installation in predetermined locations on the project.

1.6 INSTRUCTIONS

A. Hardware Set Symbols on Drawings: Except for protective plates, door stops, mutes, thresholds and the like specified herein, hardware requirements for each door are indicated on drawings by symbols. Symbols for hardware sets consist of letters "HW" followed by a number. Each number designates a set of hardware items applicable to a door type.

B. Manufacturers' Catalog Number References: Where manufacturers' products are specified herein, products of other manufacturers which are considered equivalent to those specified may be used. Manufacturers whose products are specified are identified by abbreviations as follows:

Adams-Rite	Adams Rite Mfg. Co.	Glendale, CA
Glynn Johnson	Glynn Johnson Co.	Chicago, IL
LCN	LCN Closers	Princeton, IL
Firemark	Rixon-Firemark Co.	Chicago, IL
Hager	Hager Hinge Company	Saint Louis, MO
Stanley	The Stanley Works	New Britain, CT
Trimco	Triangle Brass Mfg. Co.	Los Angeles, CA

Unican	Simplex Security Systems	Collinsville, CT
Von Duprin	Von Duprin Hardware Co.	Indianapolis, IN
Zero	Zero Weather Stripping Co.	New York, NY

C. Keying: All cylinders shall be keyed into existing Grand Master Key System. Provide removable core cylinders that are removable only with a special key or tool without disassembly of knob or lockset. Cylinders shall be 7 pin type. Keying information shall be furnished at a later date by the Resident Engineer.

D. Interchangeable Core and Key Part Numbers are: KABA-ILCO/Peaks.
   1. 3850-25-1007 P3 50%
   2. 3850-25-1007 P4 50%.
   3. Elevator key switch – 7 pin SFIC
   4. Electric panel covers – 7 pin SFIC.
   5. Dealer code: A02 N01.
   6. Key part number: 3850-00-0003.

E. Provide spare cores as follows:
   P1 Keyway: 50%.
   P2 Keyway: 40%.
   P3 Keyway: 50%.
   P4 Keyway: 50%.

PART 2 – PRODUCTS

2.1 MATERIALS

A. LEED Requirements:
   1. Recycled Content of Steel Products: Provide steel products with minimum 25% post-consumer recycled content.

2.2 BUTT HINGES

A. ANSI A156.1. The following types of butt hinges shall be used for the types of doors listed, except where otherwise specified:
   1. Exterior Doors: Type A2112 for doors 900 mm (3 feet) wide or less and Type A2111 for doors over 900 mm (3 feet) wide. Hinges for exterior doors shall have non-removable pins.
   2. Interior Doors: Type 8112 for doors 900 mm (3 feet) wide or less and Type A8111 for doors over 900 mm (3 feet) wide.
   3. Automatic doors hung on butts, provide Type A2111 for exterior doors and aluminum doors, and Type A8111 for other doors.
   4. Labeled Wood Fire Doors: Type 8411 or Type 8412; these hinges shall be thru bolted to door with hex nuts and bolts.

B. See Articles "MISCELLANEOUS HARDWARE" and "HARDWARE SETS" for pivots and hinges other than butts specified above and continuous hinges specified below.

2.3 CONTINUOUS HINGES

A. ANSI/BHMA A156.26, Grade 1-150.
   1. Listed under Category N in BHMA's "Certified Product Directory."

B. General: Minimum 0.120-inch- (3.0-mm-) thick, hinge leaves with minimum overall width of 4 inches (102 mm); fabricated to full height of door and frame and to template screw locations; with components finished after milling and drilling are complete:
   1. Fire Pins: Steel pins to hold labeled fire doors in place if required by tested listing.

C. Continuous, Gear-Type Hinges: Extruded-aluminum, pinless, geared hinge leaves; joined by a continuous extruded-aluminum channel cap; with concealed, self-lubricating thrust bearings.
   1. Manufacturers:
      a. Bommer Industries, Inc.
      b. Hager Companies.
      c. McKinney Products Company; an ASSA ABLOY Group company.
      d. Pemko Manufacturing Co.
      e. Select Products Limited.
      f. Zero International.

2.4 DOOR CLOSING DEVICES

A. Closing devices shall be products of one manufacturer.

2.5 OVERHEAD CLOSERS

A. Conform to ANSI A156.4, Grade 1.

B. Closers shall conform to the following:
   1. The closer shall have 50 percent adjustable closing force over minimum value for that closer and have adjustable hydraulic back check effective between 60 degrees and 85 degrees of door opening.
   2. Where specified, closer shall have hold-open feature.
   3. Size Requirements: Size closers in accordance with manufacturer’s recommendations or provide multi-size closers, sizes 1 through 6.
   4. Material of closer shall be forged or cast iron or cast aluminum.
   5. Arm and brackets for closers shall be steel, malleable iron or high strength ductile cast iron.
   6. Closers shall have full size cover.

7. Closers shall have adjustable hydraulic back-check and separate valves for closing and latching speed.

2.6 COMBINATION CLOSER – HOLDER

A. Conform to ANSI A156.15; combination closer-holder with built-in electronic release.

B. Combination closer-holder shall have the following features:

1. Control door closing and latching sequence by hydraulic action.
2. Wiring for 24V DC current. Current draw shall not exceed 0.16 amperes.
3. Double level arm closing action, and adjustable hydraulic back-check.
4. Spring power for closing force shall conform to ANSI A156.4 and have 50% spring power adjustment.
5. Closer Size Requirements:
   a. Doors, 900 mm (3 feet) and less in width: Size III closer.
   b. Doors over 900 mm (3 feet) and less than 1050 mm (3 feet 6 inches) in width: Size IV closer.
   c. Doors 1050 mm (3 feet 6 inches) and over in width: Size V closer.
6. Hold open mechanism shall hold door open between 85 degrees and 180 degrees depending on wall and frame conditions. Mount device to provide maximum door opening permitted by building construction or equipment.
7. Electronic release shall release door when signaled by smoke detector. Smoke detectors shall not be incorporated as an integral part of door holders. Smoke detectors are specified in the ELECTRICAL Section.
8. All closers to have full covers.
9. All closers shall have a 1 1/2” piston and an adjustable back check position valve.

2.7 DOOR STOPS

A. Conform to ANSI A156.16.

B. Provide door stops wherever an opened door or any item of hardware thereon would strike a wall, column, equipment or other parts of building construction. For concrete, masonry or quarry tile construction, use lead expansion shields for mounting door stops.

C. Where cylindrical locks with turn pieces or pushbuttons occur, equip wall bumpers Type L02251 (rubber pads having concave face) to receive turn piece or button.

D. Substitute floor stops Type L02141 or L02161 as appropriate, when wall bumpers would not provide an effective door stop.

E. Where drywall partitions occur, use floor stops, Type L02141 or L02161.

F. Provide stop Type L02011 or L02181, as applicable for exterior doors.

G. Omit stops where floor mounted door holders are required and where automatic operated doors occur.

H. Provide appropriate roller bumper for each set of doors (except where closet doors occur) where two doors would interfere with each other in swinging.

I. Provide appropriate door mounted stop on doors in individual toilets where floor or wall mounted stops cannot be used.

J. Provide overhead surface applied stop Type C02541, ANSI A156.8 on patient toilet doors in bedrooms where toilet door could come in contact with the bedroom door.

K. Provide door stops on doors where combination closer magnetic holders are specified.

2.8 OVERHEAD DOOR HOLDERS

A. Conform to ANSI Standard A156.8. Overhead holders shall be of sizes recommended by holder manufacturer for each width of door. Set overhead holders for 110 degree opening, unless limited by building construction or equipment.

2.9 FLOOR DOOR HOLDERS

A. Conform to ANSI Standard A156.16. Provide extension strikes for Types L01301 and L01311 holders where necessary.

2.10 LOCKS AND LATCHES

A. Conform to ANSI A156.2. Locks and latches for doors 45 mm (1-3/4 inch) thick or over shall have beveled fronts. Lock cylinders shall have not less than seven pins. Cylinders for all locksets shall be removable core type. Cylinders shall be furnished with construction removable cores and construction master keys. Cylinder shall be removable by special key or tool. Construct all cores so that they will be interchangeable into the core housings of all mortise locks, rim locks, cylindrical locks, and any other type lock included in the Great Grand Master Key System. Disassembly of lever or lockset shall not be required to remove core from lockset. All locksets or latches on double doors with fire label shall have latch bolt with 19 mm (3/4 inch) throw. Provide temporary keying device or construction core of allow

opening and closing during construction and prior to the installation of final cores.

B. SFIC: Small format interchangeable core 7 pin.

C. In addition to above requirements, locks and latches shall comply with following requirements:

1. Mortise Lock and Latch Sets: Conform to ANSI/BHMA A156.13. Mortise locksets shall be series 1000, minimum Grade 1. All locksets and latchsets shall have lever handles similar to Best 45H or Schlage 9800. Lever handle shall be fabricated from wrought stainless steel. No substitute lever design or material shall be accepted. All locks and latchsets shall be furnished with curved lip strike and wrought box. Lock function F02 shall be furnished with key plates similar to Russwin's No. A70. Furnish armored fronts for all mortise locks.
2. Auxiliary locks shall be as specified under hardware sets and conform to ANSI A156.5.
3. Private office doors shall have cylinder locksets where indicated in hardware sets.

2.11 ELECTROMAGNETIC LOCKS

A. ANSI/BHMA A156.23; electrically powered, of strength and configuration indicated; with electromagnet attached to frame and armature plate attached to door. Listed under Category E in BHMA's "Certified Product Directory."

1. Type: Full exterior or full interior, as required by application indicated.
2. Strength Ranking: 1500 lbf (6672 N).
3. Inductive Kickback Peak Voltage: Not more than 53V.
4. Residual Magnetism: Not more than 4 lbf (18 N) to separate door from magnet.

B. Delayed-Egress Locks: BHMA A156.24. Listed under Category G in BHMA's "Certified Product Directory".

1. Means of Egress Doors: Lock releases within 15 seconds after applying a force not more than 15 lbf (67 N) for not more than 3 seconds, as required by NFPA 101.
2. Security Grade: Activated from secure side of door by initiating device.
3. Movement Grade: Activated by door movement as initiating device.

C. Manufacturers:

1. Door Controls International.

2. Doorguard Systems, Inc.
3. Dortronics Systems, Inc.
4. DynaLock Corp.
5. Locknetics; an Ingersoll-Rand Company.
6. Rutherford Controls Int'l. Corp.
7. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
8. Securitron Magnalock Corporation; an ASSA ABLOY Group company.
9. Security Door Controls.

2.12 CARD READERS AND REQUEST TO EXIT DEVICES

A. Card readers and overhead request to exit devices are provided and installed under a separate contract. Locations are indicated on Architectural drawings. These locations are inclusive of conduit for electric strikes and power for magnetic locks as required. Coordinate with electrical Drawings. Refer to Section 28 05 33 RACEWAY AND BOXES FOR ELECTRONIC SAFETY AND SECURITY for card reader installation requirements and coordination.

2.13 ELECTRIC STRIKES

A. ANSI/ BHMA A156.31 Grade 1.

B. General: Use fail-safe electric strikes with fire-rated devices.

C. Manufacturers:

1. Adams Rite Manufacturing Co.
2. Folger Adam Security Inc.; an ASSA ABLOY Group company.
3. HES, Inc.; an ASSA ABLOY Group company.
4. Locknetics; an Ingersoll-Rand Company.
5. Precision Hardware, Inc.
6. Von Duprin; an Ingersoll-Rand Company.

2.14 KEYS

A. Keying by VA locksmith.

B. Number of keys to match number of doors (x=50ΔP3, 50ΔP4).

C. Uncombinated number of cores = number of doors (x = 50ΔP3, 50ΔP4).

2.15 ARMOR PLATES, COMBINATION KICK-MOP PLATES AND DOOR EDGING

A. Conform to ANSI Standard A156.6.

B. Provide protective plates and door edging as specified below:

1. Kick-mop plates and armor plates plastic or metal, Type J100 series, color as required. When wood grain plastic plates are specified in Section 09 06 00, SCHEDULE FOR FINISHES, grain plates shall run in same direction as grain of face veneer of wood doors.

2. Provide kick-mop plates for both sides of each door, except where noted as not required. Kick-mop plates shall be 200 mm (8 inches) high. On push side of doors where jamb stop extends to floor, make combination kick-mop plates 38 mm (1-1/2 inches) less than width of door, except pairs of metal doors which shall have plates 25 mm (1 inch) less than width of each door. Extend all other combination kick-mop plates to within 6 mm (1/4 inch) of each edge of doors. Kick mop plates shall butt astragals. For jamb stop requirements, see specification sections pertaining to door frames.
3. Kick-mop plates are not required on following door sides:
   a) Armor plate side of doors;
   b) Exterior side of exterior doors;
   c) Closet side of closet doors;
   d) Storage side of doors to or from storage spaces; and
   e) Both sides of aluminum entrance doors.
4. Armor plates for doors are listed under Article "Hardware Sets". Armor plates shall be 875 mm (35 inches) high and 38 mm (1-1/2 inches) less than width of doors, except on pairs of metal doors. Plates on pairs of metal doors shall be 25 mm (1 inch) less than width of each door. Where top of intermediate rail of door is less than 875 mm (35 inches) from door bottom, extend armor plates to within 13 mm (1/2 inch) of top rail. On doors equipped with panic devices, extend armor plates to within 13 mm (1/2 inch) of panic bolt cross bar.

2.16 EXIT DEVICES

A. Conform to ANSI Standard A156.3. Exit devices shall be Grade 1; type and function are specified in hardware sets. Provide flush with finished floor strikes for vertical rod exit devices in interior of building. Trim shall have lever handles similar to locksets, unless otherwise specified.

B. Exit devices for fire doors shall comply with Underwriters Laboratories, Inc., requirements for Fire Exit Hardware. Submit proof of compliance.

2.17 FLUSH BOLTS (LEVER EXTENSION)

A. Conform to ANSI A156.16. Flush bolts shall be Type L24081 unless otherwise specified. Furnish proper dustproof strikes conforming to ANSI A156.16, for flush bolts required on lower part of doors. Modify flush bolts to fit stiles of aluminum doors on double-acting doors.

B. Face plates for cylindrical strikes shall be rectangular and not less than 25 mm by 63 mm (1 inch by 2-1/2 inches).

C. Friction-fit cylindrical dustproof strikes with circular face plate may be used only where metal thresholds occur.

2.18 FLUSH BOLTS (AUTOMATIC)

A. Conform to ANSI A156.16. Dimension of flush bolts shall conform to ANSI A115. Bolts shall conform to Underwriters Laboratories, Inc., requirements for fire door hardware. Flush bolts shall automatically latch and unlatch. Furnish dustproof strikes conforming to ANSI A156.16 for bottom flushbolt. Face plates for dustproof strike shall be rectangular and not less than 38 mm by 90 mm (1-1/2 by 3-1/2 inches).

2.19 DOOR PULLS

A. Conform to ANSI A156.6. Pull plate 90 mm by 350 mm (3-1/2 inches by 14 inches), unless otherwise specified. Cut plates of door pulls for cylinders, or turn pieces where required.

2.20 PUSH PLATES

A. Conform to ANSI A156.6. Plastic, Type J302, 200 mm (8 inches) wide by 350 mm (14 inches) high. Provide plastic Type J300 plates 100 mm (4 inches wide by 350 mm (14 inches) high) where push plates are specified for doors with stiles less than 200 mm (8 inches) wide. Color shall be as specified for kick-mop plates in Section 09 06 00, SCHEDULE FOR FINISHES. Cut plates for cylinders, and turn pieces where required. When wood grain plastic plates are specified in SCHEDULE FOR FINISHES Section, grain in plates shall run in same direction as grain of face veneer of wood doors.

2.21 COMBINATION PUSH AND PULL PLATES

A. Conform to ANSI 156.6. Type J303, stainless steel 3 mm (1/8 inch) thick, 80 mm (3-1/3 inches) wide by 800 mm (16 inches) high), top and bottom edges shall be rounded. Secure plates to wood doors with 38 mm (1-1/2 inch) long No. 12 wood screws. Cut plates for turn pieces, and cylinders where required. Pull shall be mounted down.

2.22 COORDINATORS

A. Conform to ANSI A156.16. Coordinators, when specified for fire doors, shall comply with Underwriters Laboratories, Inc., requirements for fire door hardware. Coordinator may be omitted on exterior pairs of doors where either door will close independently regardless of the position of the other door. Coordinator may be omitted on interior pairs of non-labeled open where open back strike is used. Open back

strike shall not be used on labeled doors. Paint coordinators to match door frames, unless coordinators are plated.

2.23 THRESHOLDS

A. Conform to ANSI A156.21, mill finish extruded aluminum, except as otherwise specified. In existing construction, thresholds shall be installed in a bed of sealant with machine screws and expansion shields. In new construction, embed aluminum anchors coated with epoxy in concrete to secure thresholds. Furnish thresholds for the full width of the openings.

B. For thresholds at elevators entrances see other sections of specifications.

2.24 WEATHERSTRIPS (FOR EXTERIOR DOORS)

A. Conform to ANSI A156.22. Air leakage shall not to exceed 0.50 CFM per foot of crack length (0.000774m^3/s/m).

2.25 MISCELLANEOUS HARDWARE

A. Access Doors (including Sheet Metal, Screen and Woven Wire Mesh Types): Except for fire-rated doors and doors to Temperature Control Cabinets, equip each single or double metal access door with Lock Type E76213, conforming to ANSI A156.5. Key locks as directed. Ship lock prepaid to the door manufacturer. Hinges shall be provided by door manufacturer.

B. Cylinders for Access Doors: Provide cylinders to operate locking devices where specified for following partitions and doors:

1. Fire-rated access doors-Engineer's key set.

C. Mutes: Conform to ANSI A156.16. Provide door mutes or door silencers Type L03011, of white or light gray color, on each steel door frame, except lead-lined frames and frames for sound-resistant, lightproof and electromagnetically shielded doors. Furnish 3 mutes for single doors and 2 mutes for each pair of doors, except double-acting doors. Provide 4 mutes or silencers for frames for each Dutch type door. Provide 2 mutes for each edge of sliding door which would contact door frame.

D. Smoke Seals.

2.26 PADLOCKS FOR VARIOUS DOORS, HATCHES AND COILING DOORS

A. ASTM E883, size 50 mm (2 inch) wide chain; furnish extended shackles as required by job conditions. Provide padlocks, with key cylinders, for each door in following areas as noted.

B. Key padlocks as follows:

1. Fire-rated coiling doors.
2. Roof Access and Scuttles: Engineer's set.

C. Omit padlocks on communicating refrigerator doors.

2.27 THERMOSTATIC TEMPERATURE CONTROL VALVE CABINETS

A. Where lock is shown, equip each cabinet door (metal) with lock Type E06213, conforming to ANSI A156.1. Key locks in Key Sets approved by Contracting Officer. See mechanical drawings and specifications for location of cabinets.

B. Cabinet manufacturer shall supply the hinges, bolts and pulls. Ship locks to cabinet manufacturer for installation.

2.28 FINISHES

A. Exposed surfaces of hardware shall have ANSI A156.18, finishes as specified below. Finishes on all hinges, pivots, closers, thresholds, etc., shall be as specified below under "Miscellaneous Finishes." For field painting (final coat) of ferrous hardware, see Section 09 91 00, PAINTING.

B. 630: All surfaces on exterior and interior of buildings, except where other finishes are specified.

C. Miscellaneous Finishes:

1. Hinges --exterior doors: 630.
2. Hinges --interior doors: 652.
3. Door Closers: Factory applied paint finish. Satin Aluminum color.
4. Thresholds: Mill finish aluminum.
5. Cover plates for floor hinges and pivots: 630.
6. Other primed steel hardware: 652.

D. Hardware Finishes for Existing Buildings: U.S. Standard finishes shall match finishes of hardware in (similar) existing spaces except where otherwise specified.

E. Color of Plastic Items: See Section 09 06 00, SCHEDULE FOR FINISHES. Where colors other than chocolate brown or black are specified, color of core material may be different than color of face.

2.29 BASE METALS

A. Apply specified U.S. Standard finishes on different base metals as following:

Finish	**Base Metal**
652	Steel
626	Brass or bronze
630	Stainless steel

PART 3 - EXECUTION

3.1 HARDWARE HEIGHTS

A. For existing buildings locate hardware on doors at heights to match existing hardware. The Contractor shall visit the site, verify location of existing hardware and submit locations to Resident Engineer for approval.

B. For new buildings locate hardware on doors at heights specified below unless otherwise noted:

C. Hardware Heights from Finished Floor:

1. Exit devices centerline of strike (where applicable) 1000 mm (40-5/16 inches).
2. Locksets and latch sets centerline of strike 1000 mm (40-5/16 inches).
3. Deadlocks centerline of strike 1200 mm (48 inches).
4. Centerline of door pulls to be 1000 mm (40 inches).
5. Push plates and push-pull shall be 1250 mm (50 inches) to top of plate.
6. Push-pull latch to be 1000 mm (40-5/16 inches) to centerline of strike.
7. Centerline of deadlock strike to be 840 mm (33 inches) when used with push-pull latch.
8. Locate other hardware at standard commercial heights. Locate push and pull plates to prevent conflict with other hardware.

3.2 INSTALLATION

A. Closer devices, including those with hold-open features, shall be equipped and mounted to provide maximum door opening permitted by building construction or equipment. Closers shall be mounted regular arm. Where closers are mounted on doors they shall be mounted with sex nuts and bolts; foot shall be fastened to frame with machine screws.

B. Substitute parallel arm or top jamb mounting for regular arm mounting where the following conditions occur:

1. Where door swing, in full open position, would be limited to less than 90 degrees due to partition construction and closer location.
2. Where door to room opens outward into corridor.
3. Where exterior doors open outward.

C. Hinge Size Requirements:

Door Thickness	**Door Width**	**Hinge Height**
45 mm (1-3/4 inch)	900 mm (3 feet) and less	113 mm (4-1/2 inches)
45 mm (1-3/4 inch)	Over 900 mm (3 feet) but not more than 1200 mm (4 feet)	125 mm (5 inches)

D. Hinge leaves shall be sufficiently wide to allow doors to swing clear of door frame trim.

E. Hinges Required Per Door:

Doors 1500 mm (5 ft) or less in height	2 butts
Doors over 1500 mm (5 ft) high and not over 2280 mm (7 ft 6 in) high	3 butts
Doors over 2280 mm (7 feet 6 inches) high	4 butts
Doors with spring hinges 1370 mm (4 feet 6 inches) high or less	2 butts
Doors with spring hinges over 1370 mm (4 feet 6 inches)	3 butts

F. Fastenings: Suitable size and type and shall harmonize with hardware as to material and finish. Provide machine screws and lead expansion shields to secure hardware to concrete, ceramic or quarry floor tile, or solid masonry. Fiber or rawl plugs and adhesives are not permitted. All fastenings exposed to weather shall be of nonferrous metal.

G. After locks have been installed; show in presence of Resident Engineer that keys operate their respective locks in accordance with keying requirements. Installation of locks which do not meet specified keying requirements shall be considered sufficient justification for rejection and replacement of all locks installed on project.

3.3 HARDWARE SETS

A. Following sets of hardware correspond to hardware symbols shown on drawings. Where hardware set for a single door is specified for a pair of doors; equip each leaf of such pair of doors with set noted. Only those hardware sets that are shown on drawings will be required. Disregard hardware sets listed in specifications but not shown on drawings.

HARDWARE SETS HW 1 TO 168 (NOT USED)

HW 169
Hardware by coiling door manufacturer; Section 08 33 00
1 Ea. Cylinder-type as required

HW 170
2 Ea. Continuous Gear Hinges Heavy Duty with EPT prep
2 Ea. Power Transfers EPT
1 Ea. Concealed Vertical Rod Exit Device Type 6 Function 03
Electric Latch Retraction
1 Ea. Concealed Vertical Rod Exit Device Type 6 Function 01
Electric Latch Retraction
1 Ea. Cylinder – provide type required for trim
1 Ea. Power Supply with battery Back Up to operate 2 ELR devices
1 Ea. Card Reader – (By Security Vendor) for active leaf only
1 Ea. Closer CO2021
1 Ea. Automatic Door Operator; see Section 08 71 13
1 Ea. Actuator – push pad type
2 Ea. Armor Plates J101 4BE 42” height
1 Ea. Weatherstripping ROY 164 bulb
1 Ea. Set Adjustable Weatherstripping Astragal ROY834
1 Ea. Threshold J32100
2 Ea. Door Sweeps ROY 536 vinyl
1 Ea. Rain Drip x 4” over door width
2 Ea. Door Monitoring Contacts
1 Ea. P.I.R. (By Security Vendor)

Door Sequence: Card Reader (provided and installed by Security Vendor) allows valid entry into building via one door (other door is latched). PIR sensor (provided and installed by Security Vendor) mounted above doors turns off door monitoring for programmed period of time allowing free exit from building.

HW 171

2 Ea. Continuous Gear Hinges Heavy Duty with EPT prep
2 Ea. Power Transfers EPT
2 Ea. Exit Device Type 6 Function 03
Electric Latch Retraction, Cylinder Dogging
4 Ea. Cylinder – provide type required for trim and dogging
1 Ea. Power Supply with Battery Back Up to operate 2 ELR devices
1 Ea. Card Reader – (By Security Vendor)
2 Ea. Automatic Door Operator; See Section 08 71 13
2 Ea. Actuators – push pad type
1 Ea. Weatherstripping – By Door Manufacturer
1 Ea. Threshold – By Door Manufacturer
1 Ea. Rain Drip x 4" over door width
2 Ea. Door Monitoring Contacts
1 Ea. P.I.R. Sensor (By Security Vendor)
2 Ea. Electromagnetic Locks
1 Ea. Card Reader (By Security Vendor) for both leaves
1 Ea. Emergency Override Button - Located in Lobby

Door Sequence: During regular business hours, door will operate by via interior and exterior automatic door operator sensor.

After hours, magnetic locks are energized. Card Reader (provided, installed and programmed by Security Vendor) de-energizes magnetic locks & operates automatic doors. PIR operates automatic doors from interior.

Emergency override button installed in lobby de-energizes magnetic locks and operates automatic doors or allows doors to be pushed open.

HW 172

3 Ea. Butts as required NRP
1 Ea. Exit Device Type 1 Function 03
1 Ea. Cylinder – provide type required
1 Ea. Closer C02021
1 Ea. Kick plate J102 4BE
1 Ea. Weatherstripping ROY 164 bulb
1 Ea. Threshold J32100
1 Ea. Door Sweep ROY 536 vinyl
1 Ea. Rain Drip x 4" over door width
1 Ea. Door Monitoring Contact

HW 173

3 Ea. Butts as required
1 Ea. Classroom Lockset F05
1 Ea. Kick plate J102 4BE
1 Ea. Closer C2011
1 Ea. Weatherstripping ROY 164 bulb
1 Ea. Threshold J32100
1 Ea. Door Sweep ROY 416 brush
1 Ea. Rain Drip x 4" over door width
1 Ea. Door Monitoring Contact

HW 173A 3 Ea. Butts as required NRP 1 Ea. Electric Lockset 1 Ea. Kick plate J102 4BE 1 Ea. Closer C2021 1 Ea. Weatherstripping ROY 164 bulb 1 Ea. Threshold J32100 1 Ea. Door Sweep ROY 536 vinyl 1 Ea. Rain Drip x 4” over door width 1 Ea. Door Monitoring Contact 1 Ea. Card Reader (By Security Vendor) 1 Ea. Power Supply for Reader – (By Security Vendor) Door Sequence: Card Reader (provided and installed by Security Vendor) allows valid access onto roof. Exit hardware on outside of door will allow entry into building.
HW 173B 3 Ea. Butts as required 1 Ea. Electric Lockset 1 Ea. Kick plate J102 4BE 1 Ea. Closer C2011 1 Ea. Weatherstripping ROY 164 bulb 1 Ea. Threshold J32100 1 Ea. Door Sweep ROY 416 brush 1 Ea. Rain Drip x 4” over door width 1 Ea. Door Monitoring Contact 1 Ea. Card Reader (By Security Vendor) 1 Ea. P.I.R. Sensor (By Security Vendor) Door Sequence: Card Reader (provided and installed by Security Vendor) allows valid access into room. PIR sensor (provided and installed by Security Vendor) mounted above door in space turns off door monitoring for programmed period of time allowing free exit from room.

HW 174
2 Ea. Continuous Gear Hinges Heavy Duty with EPt prep
2 Ea. Power Transfers EPT
2 Ea. Concealed Vertical Rod Exit Device Type 6 Function 03 Electric Latch Retraction
2 Ea. Cylinders – provide type required for trim
1 Ea. Power Supply with batter Back Up to operate 2 ELR devices
1 Ea. Card Reader – (By Security Vendor)
1 Ea. Power Supply for Reader – (By Security Vendor)
2 Ea. Automatic Door Operator; see Section 08 71 13
1 Ea. Actuator push pad type
2 Ea. Armor Plates J101 4BE 42” height
1 Ea. Weatherstripping ROY 164 bulb
1 Ea. Set adjustable weatherstripping astragal ROY834
1 Ea. Threshold J32100
2 Ea. Door Sweeps ROY 416 Brush
1 Ea. Rain Drip x 4” over door width
2 Ea. Door Monitoring Contacts
1 Ea. Emergency Key Override – Located in Lobby
1 Ea. Emergency Button Override – Located Outside Doors
1 Ea. P.I.R. Sensor (By Security Vendor)

Door Sequence: Card Reader (provided and installed by Security Vendor) functions as actuator button, de-energizes magnetic locks and operates automatic doors elevator lobby. Emergency key override installed in lobby de-energizes magnetic locks and operates automatic doors or allows doors to be pushed open.

PIR sensor (provided and installed by Security Vendor) de-energizes magnetic locks and operates automatic doors from exterior. Emergency override button installed outside de-energizes magnetic locks and operates automatic doors or allows doors to be pulled open.

HW 175 - rated

Hinges		QUANTITY & TYPE AS REQUIRED
1	Set Auto Flush Bolts	TYPE 25 LESS BOTTOM BOLT
1	Storeroom Lock	F07
1	Coordinator	TYPE 21A
1	Overlapping Astragal with Self-Adhesive Seal	R5Y634 x R0E154 x THRU-BOLTS
2	Closers	C02011/C02021 (PT4D, PT4F, PT4H)
2	Heavy-Duty Armor Plates	J101 x 3.175 MM (0.125 INCH THICKNESS
2	Overhead Stops	C01541-ADJUSTABLE

HW 176 - rated

	Hinges	QUANTITY & TYPE AS REQUIRED
1	Electrified Lock	Storeroom F07
1	Closer	C02011/C02021 (PT4D, PT4F, PT4H)
1	Electric Strike	
1	In-Line Power Conditioner/Rectifier	
1	Mortar Box	
1	Door Status Contact	
1	Heavy-Duty Armor Plate	J101 x 3.175 MM (0.125 INCH) THICKNESS
1	Card Reader and Request to Exit (By Security Vendor)	
1	Power Supply for Reader (By Security Vendor)	

Door Sequence: Card Reader (provided and installed by Security Vendor) allows valid access into room.
PIR sensor (provided and installed by Security Vendor) mounted above door in space turns off door monitoring for programmed period of time allowing free exit from room.

HW 177 – not rated

	Hinges	QUANTITY & TYPE AS REQUIRED
1	Electrified Lock	Storeroom F07
1	Closer	C02011/C02021 (PT4D, PT4F, PT4H)
1	Electric Strike	
1	In-Line Power Conditioner/Rectifier	
1	Mortar Box	
1	Door Status Contact	
1	Heavy-Duty Armor Plate	J101 x 3.175 MM (0.125 INCH) THICKNESS
1	Card Reader and Request to Exit (By Security Vendor)	
1	Power Supply for Reader (By Security Vendor)	

Door Sequence: Card Reader (provided and installed by Security Vendor) allows valid access into room. PIR sensor (provided and installed by Security Vendor) mounted above door in space turns off door monitoring for programmed period of time allowing free exit from room.

HW 178 – not rated

2	Closers	
2	Push/Pulls	
2	Floor Stops	L02121 x 3 FASTENERS
1	Heavy-Duty Armor Plate	J101 x 3.175 MM (0.125 INCH) THICKNESS

HW 179 - rated

	Hardware by coiling door manufacturer; Section 08 33 00	
1	Ea. Cylinder-type as required	

HW 180 – Not Rated

2 Ea. Continuous Gear Hinges Heavy Duty
2 Ea. Power Transfers EPT
2 Ea. Automatic Door Operator; See Section 08 71 13
2 Push/Pull Bar Sets J505 – 305 MM (12 INCH) CENTER-TO-CENTER PULL

AUTO DOOR OPERATORS, CONTROLS, AND REACTIVATION SENSORS BY SECTION 08 71 13.11.

POWER TRANSFERS FOR RE-ACTIVATION SENSOR WIRING (RE-ACTIVATION SENSORS PROVIDED BY SECTION 08 71 13). 120VAC POWER, CONDUIT, AND WIRING BY DIVISION 26.

Door Sequence: Door will operate via interior and exterior automatic door operator sensor.

HW 181 – not rated

	Hinges	QUANTITY & TYPE AS REQUIRED
1	Electrified Lock	Storeroom F07
1	Closer	
1	Exit hardware	
1	Electric Strike	
1	In-Line Power Conditioner/Rectifier	
1	Mortar Box	
1	Door Status Contact	
1	Overhead Stop	
1	Card Reader (By Security Vendor)	
1	Power Supply for Reader (By Security Vendor)	

Door Sequence: Card Reader (provided and installed by Security Vendor) allows valid access into room.
PIR sensor (provided and installed by Security Vendor) mounted above door in space turns off door monitoring for programmed period of time allowing free exit from space.

HW 182 – not rated

	Hinges	QUANTITY & TYPE AS REQUIRED
1	Electrified Lock	Passage F31
1	Electric Strike	
1	In-Line Power Conditioner/Rectifier	
1	Mortar Box	
1	Door Status Contact	
1	Closer	C02011/C02021 (PT4D, PT4F, PT4H)
1	Overhead Stop	
1	Set Self-Adhesive Seals	R0E154
1	Card Reader (By Security Vendor)	
1	Power Supply for Reader (By Security Vendor)	

Door Sequence: Card Reader (provided and installed by Security Vendor) allows valid access into elevator lobby.
PIR sensor (provided and installed by Security Vendor) mounted above door in space turns off door monitoring for programmed period of time allowing free exit from elevator lobby.

HW 183 – not rated

	Hinges	QUANTITY & TYPE AS REQUIRED
1	Electrified Lock	Storeroom F07
1	Electric Strike	
1	In-Line Power Conditioner/Rectifier	
1	Mortar Box	
1	Door Status Contact	
1	Closer	
1	Heavy-Duty Armor Plate	J101 x 3.175 MM (0.125 INCH) THICKNESS
	Overhead Stop	
1	Set Self-Adhesive Seals	R0E154
1	Card Reader (By Security Vendor)	
1	Power Supply for Reader (By Security Vendor)	

Door Sequence: Card Reader (provided and installed by Security Vendor) allows valid access into room.
PIR sensor (provided and installed by Security Vendor) mounted above door in space turns off door monitoring for programmed period of time allowing free exit from room.

HW 184 – not rated

1	Classroom Lock	F08
1	Set Self-Adhesive Seals	R0E154
2	Automatic Door Operator; see Section 08 71 13	

AUTOMATIC DOOR OPERATOR AND CONTROLS BY SECTION 08 71 13, AUTOMATIC DOOR OPERATORS.
POWER TRANSFER FOR RE-ACTIVATION SENSOR WIRING (RE-ACTIVATION SENSORS PROVIDED BY SECTION 08 71 13).

HW 185 – not rated

	Hinges	QUANTITY & TYPE AS REQUIRED
1	Storeroom Lock F07	
1	Electric Strike	
1	Electrified Lock	Storeroom F07
1	In-Line Power Conditioner/Rectifier	
1	Mortar Box	
1	Door Status Contact	
1	Closer	C02011/C02021 (PT4D, PT4F, PT4H)
1	Wall Stop	L52101 CONVEX
1	Card Reader (By Security Vendor)	
1	Power Supply for Reader (By Security Vendor)	

Door Sequence: Card Reader (provided and installed by Security Vendor) allows valid access into room.
PIR sensor (provided and installed by Security Vendor) mounted above door in space turns off door monitoring for programmed period of time allowing free exit from room.

HW 186 – not rated

	Hinges	QUANTITY & TYPE AS REQUIRED
1	Latchset	F01 (Passage)
1	Door pull	
1	Push-pull plate	J303
1	Closer	C02051
1	Heavy-Duty Armor Plate THICKNESS	J101 x 3.175 MM (0.125 INCH)
1	Wall Stop	L52101 CONVEX
3	Silencers	L03011

HW 187 – not rated

	Hinges	QUANTITY & TYPE AS REQUIRED
1	Classroom Lock	F08
1	Wall Stop	L52101 CONVEX
3	Silencers	L03011

HW 188 – not rated

	Hinges	QUANTITY & TYPE AS REQUIRED
1	Privacy Lock	F02-MOD X OCCUPANCY INDICATOR
1	Kick Plate	J102
1	Mop Plate	J102
1	Wall Stop	L52101 CONVEX
3	Silencers	L03011

HW 189 – not rated

	Hinges	QUANTITY & TYPE AS REQUIRED
1	Electric Strike	
1	Electrified Lock	Storeroom F07
1	In-Line Power Conditioner/Rectifier	
1	Mortar Box	
1	Door Status Contact	
1	Closer	C02011/C02021 (PT4D, PT4F, PT4H)
1	Kick Plate	J102
1	Wall Stop	L52101 CONVEX
1	Card Reader (By Security Vendor)	
1	Power Supply for Reader (By Security Vendor)	

Door Sequence: Card Reader (provided and installed by Security Vendor) allows valid access into room.
PIR sensor (provided and installed by Security Vendor) mounted above door in space turns off door monitoring for programmed period of time allowing free exit from room.

HW 190 – not rated

	Hinges	QUANTITY & TYPE AS REQUIRED
1	Storeroom Lock F07	
1	Wall Stop	L52101 CONVEX

HW 191 – not rated

	Hinges quantity as required	180 degree hinges (Except at door GA115)
1	Storeroom Lock	F07
1	Wall Stop	L52101 CONVEX

HW 192 – not rated

	Hinges	QUANTITY & TYPE AS REQUIRED
1	Utility Lock	F09
2	Closer	C02051/C02061 (PT4D, PT4H)
2	Overhead Stop	C04541
2	Sets Self-Adhesive Seals	R0E154

Note: If Alternate #2 is accepted, this hardware set will be provided by the Demountable partition sub contractor.

HW 193 – not rated

	Hinges	QUANTITY & TYPE AS REQUIRED
1	Utility Lock	F09
1	Closer	C02051/C02061 (PT4D, PT4H)
1	Overhead Stop	C04541
1	Set Self-Adhesive Seals	R0E154

Note: If Alternate #2 is accepted, this hardware set will be provided by the Demountable partition sub contractor.

HW 194 – not rated

	Hinges	QUANTITY & TYPE AS REQUIRED
1	Office Lock	F04
1	Wall Stop	L52101 CONVEX
1	Set Self-Adhesive Seals	R0E154
1	Coat Hook	L03121

Note: If Alternate #2 is accepted, this hardware set will be provided by the Demountable partition sub contractor.

HW 195 – not rated

	Hinges	QUANTITY & TYPE AS REQUIRED
1	Classroom Lock F75	
1	Closer	
1	Overhead Stop	C04541 (at GA118A)
1	Wall Stop	L52101 CONVEX (at GA118)

HW 196 – not rated

	Hinges	QUANTITY & TYPE AS REQUIRED
1	Latchset	F01
1	Closer (@ non-rated doors)	C02051/C02061 (PT4D, PT4H)
1	Wall Stop	L52101 CONVEX
1	Set Self-Adhesive Seals	R0E154

HW 197 – rated		
2	Continuous Hinges	A51031B x INTEGRAL HINGE GUARD CHANNEL X ADJUSTA-SCREWS
1	Auto Flush Bolt	TYPE 25 LESS BOTTOM BOLT (on active leaf)
1	Auto Flush Bolt	TYPE 25 (on inactive leaf)
1	Classroom Lock	F08
1	Coordinator	TYPE 21A
1	Overlapping Astragal with Self-Adhesive Seal	R5Y634 x R0E154 x THRU-BOLTS
2	Closers	C02011/C02021 (PT4D, PT4F, PT4H)
2	Heavy-Duty Armor Plates	J101 x 3.175 MM (0.125 INCH) THICKNESS
1	Lock Trim Protector Bar	R111LPB-630 (ROCKWOOD), OR EQUAL
2	Overhead Stops	C01541-ADJUSTABLE
2	Auto Door Bottoms	R0Y346 – HEAVY DUTY
2	Set Self-Adhesive Seals	R0E154
INSTALL LOCK TRIM PROTECTOR BAR ON PUSH SIDE OF ACTIVE LEAF TO PROTECT LEVER TRIM.		
HW 198 – not rated		
2	Continuous Hinges	A51031B x INTEGRAL HINGE GUARD CHANNEL x ADJUSTA-SCREWS
1	Auto Flush Bolt	TYPE 25 LESS BOTTOM BOLT
1	Passage Lock	F01
1	Coordinator	TYPE 21A
1	Overlapping Astragal with Self-Adhesive Seal	R5Y634 x R0E154 x THRU-BOLTS
2	Closers	C02011/C02021 (PT4D, PT4F, PT4H)
2	Heavy-Duty Armor Plates	J101 x 3.175 MM (0.125 INCH) THICKNESS
1	Lock Trim Protector Bar	R111LPB-630 (ROCKWOOD), OR EQUAL
2	Overhead Stops	C01541-ADJUSTABLE
2	Auto Door Bottoms	R0Y346 – HEAVY DUTY
2	Set Self-Adhesive Seals	R0E154
HW 199 – rated		
	Hinges	QUANTITY & TYPE AS REQUIRED
1	Storeroom Lock	F07
1	Closer	C02011/C02021 (PT4D, PT4F, PT4H)
1	Overhead Stop	C01541-ADJUSTABLE
1	Wall Stop	L52101 CONVEX (at GA142A)
1	Set Self-Adhesive Seals	R0E154
HW 200 - rated		
1	Continuous Hinge	A51031B x INTEGRAL HINGE GUARD CHANNEL X ADJUSTA-SCREWS
1	Exit Device	TYPE 1 F08 LEVER
1	Key Cylinder	TYPE AS REQUIRED
1	Closer	C02011/C02021 (PT4D, PT4F, PT4H)
1	Wall Stop	L52101 CONVEX
1	Set Self-Adhesive Seals	R0E154

HW 201 – rated

1	Continuous Hinge	A51031B x INTEGRAL HINGE GUARD CHANNEL X ADJUSTA-SCREWS
1	Exit Device	TYPE 1 F08 LEVER
1	Key Cylinder	TYPE AS REQUIRED
1	Closer	C02011/C02021 (PT4D, PT4F, PT4H)
1	Wall Stop	L52101 CONVEX
1	Set Self-Adhesive Seals	R0E154
1	Electric Strike	
1	Electrified Lock	TYPE AS REQUIRED
1	In-Line Power Conditioner/Rectifier	
1	Mortar Box	
1	Door Status Contact	
1	Card Reader (By Security Vendor)	
1	Power Supply for Reader (By Security Vendor)	

Door Sequence: Card Reader (provided and installed by Security Vendor) allows valid access from stairway into space.
PIR sensor (provided and installed by Security Vendor) mounted above door in space turns off door monitoring for programmed period of time allowing free exit into stairway from basement.

HW 202 – rated

1	Continuous Hinge	A51031B x INTEGRAL HINGE GUARD CHANNEL X ADJUSTA-SCREWS
1	Exit Device	TYPE 1 F08 LEVER (Exit only, no readmittance)
1	Key Cylinder	TYPE AS REQUIRED
1	Closer	C02011/C02021 (PT4D, PT4F, PT4H)
1	Overhead Stop	C01541-ADJUSTABLE
1	Set Self-Adhesive Seals	R0E154

HW 203 – not rated

	Hinges	QUANTITY & TYPE AS REQUIRED
1	Latchset	F01
1	Overhead Stop	C01541-ADJUSTABLE
1	Set Self-Adhesive Seals	R0E154

Note: If Alternate #2 is accepted, this hardware set will be provided by the Demountable partition sub contractor.

HW 204 – not rated

	Hinges	QUANTITY & TYPE AS REQUIRED
1	Latchset	F01
1	Wall Stop	L52101 CONVEX
1	Set Self-Adhesive Seals	R0E154

Note: If Alternate #2 is accepted, this hardware set will be provided by the Demountable partition sub contractor.

HW 205 – rated

2	Continuous Hinges	A51031B x INTEGRAL HINGE GUARD CHANNEL X ADJUSTA-SCREWS
1	Auto Flush Bolt	TYPE 25 LESS BOTTOM BOLT (on active leaf)
1	Auto Flush Bolt	TYPE 25 (on inactive leaf)
1	Classroom Lock	F08
1	Coordinator	TYPE 21A
1	Overlapping Astragal with 2 Sets Self-Adhesive Seal	R5Y634 x R0E154 x THRU-BOLTS
2	Closers	C02011/C02021 (PT4D, PT4F, PT4H)
2	Heavy-Duty Armor Plates	J101 x 3.175 MM (0.125 INCH) THICKNESS
1	Lock Trim Protector Bar	R111LPB-630 (ROCKWOOD), OR EQUAL
2	Overhead Stops	C01541-ADJUSTABLE
2	Set Self-Adhesive Seals	R0E154

INSTALL LOCK TRIM PROTECTOR BAR ON PUSH SIDE OF ACTIVE LEAF TO PROTECT LEVER TRIM.

HW 206 – rated
2A143

2	Continuous Hinges	A51031B x INTEGRAL HINGE GUARD CHANNEL X ADJUSTA-SCREWS
1	Auto Flush Bolt	TYPE 25 LESS BOTTOM BOLT (on active leaf)
1	Auto Flush Bolt	TYPE 25 (on inactive leaf)
1	Latchset	F01
1	Coordinator	TYPE 21A
1	Overlapping Astragal with Self-Adhesive Seal	R5Y634 x R0E154 x THRU-BOLTS
2	Closers	C02011/C02021 (PT4D, PT4F, PT4H)
2	Heavy-Duty Armor Plates	J101 x 3.175 MM (0.125 INCH) THICKNESS
1	Lock Trim Protector Bar	R111LPB-630 (ROCKWOOD), OR EQUAL
2	Overhead Stops	C01541-ADJUSTABLE
2	Set Self-Adhesive Seals	R0E154

INSTALL LOCK TRIM PROTECTOR BAR ON PUSH SIDE OF ACTIVE LEAF TO PROTECT LEVER TRIM.

HW 207 - rated

1	Continuous Hinge	A51031B x INTEGRAL HINGE GUARD CHANNEL X ADJUSTA-SCREWS
1	Exit Device	TYPE 1 F08 LEVER
1	Key Cylinder	TYPE AS REQUIRED
1	Closer	C02011/C02021 (PT4D, PT4F, PT4H)
1	Set Self-Adhesive Seals	R0E154
1	Overhead Stop	C01541-ADJUSTABLE

HW 208 - rated

	Hinges	QUANTITY & TYPE AS REQUIRED
1	Electric Strike	
1	Electrified Lock	Storeroom F07
1	In-Line Power Conditioner/Rectifier	
1	Mortar Box	
1	Door Status Contact	
1	Closer	C02011/C02021 (PT4D, PT4F, PT4H)
1	Armor Plate	J101 x 1.275 MM (0.050 INCH) THICKNESS
1	Overhead Stop	C01541-ADJUSTABLE
1	Set Self-Adhesive Seals	R0E154
1	Card Reader (By Security Vendor)	
1	Power Supply for Reader (By Security Vendor)	

Door Sequence: Card Reader (provided and installed by Security Vendor) allows valid access from bridge into vestibule. PIR sensor (provided and installed by Security Vendor) mounted above door in space turns off door monitoring for programmed period of time. Card Reader (provided and installed by Security Vendor) allows valid access from vestibule into bridge.

HW 209 - rated

2	Continuous Transfer Hinges	A51031B x INTEGRAL HINGE GUARD CHANNEL X ADJUSTA-SCREWS x (2) 4-THRUWIRE TRANSFERS X IN-HINGE ACCESS PANEL
1	Key Cylinder	TYPE AS REQUIRED
1	Coordinator	TYPE 21A
1	Overlapping Astragal with Self-Adhesive Seal	R5Y634 x R0E154 x THRU-BOLTS
2	Armor Plates	J101 x 1.275 MM (0.050 INCH) THICKNESS
2	Overhead Stops	C01541-ADJUSTABLE
2	Sets Self-Adhesive Seals	R0E154
2	Key Override Switch	
1	Door Status Contact	
1	Electromagnetic Lock	
1	Card Reader (By Security Vendor)	
1	Power Supply for Reader (By Security Vendor)	
2	Automatic Door Operator; see Section 08 71 13	

TOP POWER TRANSFER IS FOR RE-ACTIVATION SENSOR WIRING (RE-ACTIVATION SENSORS PROVIDED BY SECTION 08 71 13).
AUTOMATIC DOOR OPERATOR AND CONTROLS BY SECTION 08 71 13, AUTOMATIC DOOR OPERATORS.

Notes:

1. Door status switches (door contacts) shall be installed in the door frame.
2. Card reader operations shall be “fail safe open” allowing free entry when card reader is activated or loss of power. Doors with card readers shall allow free exiting at all times.
3. Provide fire labeled hardware at fire rated doors. See door schedule for location and rating of fire doors.

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SECTION 08 71 13
AUTOMATIC DOOR OPERATORS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies equipment, controls and accessories for automatic operation of swing and sliding doors.

1.2 RELATED WORK

A. Aluminum frames entrance work; Section 08 41 13, ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS.

B. Door hardware; Section 08 71 00, DOOR HARDWARE.

C. Section 28 05 33, WIRING FOR CARD READERS AND ELECTRONIC DEVICES.

D. Glass and glazing of doors and frames; Section 08 80 00, GLAZING.

E. Electric general wiring, connections and equipment requirements; Division 26, ELECTRICAL.

1.3 QUALITY ASSURANCE

A. Automatic door operators, controls and other equipment shall be products of a manufacturer regularly engaged in manufacturing such equipment for a minimum of three years.

B. One type of automatic door equipment shall be used throughout the building.

C. Equipment installer shall have specialized experience and shall be approved by the manufacturer.

1.4 WARRANTY

A. Automatic door operators shall be subject to the terms of the "Warranty of Construction" Article of Section 00 72 00, GENERAL CONDITIONS, except that the Warranty period shall be two years in lieu of one year.

1.5 MAINTENANCE MANUALS

A. In accordance with Section 01 00 00, GENERAL REQUIREMENTS Article titled "INSTRUCTIONS", furnish maintenance manuals and instructions on automatic door operators.

1.6 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's literature and data describing operators, power units, controls, door hardware and safety devices.

C. Shop Drawings:

1. Showing location of controls and safety devices in relationship to each automatically operated door.

2. Showing layout, profiles, product components, including anchorage, accessories, as applicable.
3. Submit templates, wiring diagrams, fabrication details and other information to coordinate the proper installation of the automatic door operators.

D. Submit in writing to Resident Engineer that items listed in Article 1.3 are in compliance.

1.7 DESIGN CRITERIA

A. As a minimum automatic door equipment shall comply with the requirements of BHMA 156.10. Except as otherwise noted on drawings, provide operators which will move the doors from the fully closed to fully opened position in three seconds maximum time interval, when speed adjustment is at maximum setting.

B. Equipment: Conforming to UL 325. Provide key operated power disconnect wall switch for each door installation.

C. Electrical Wiring, Connections and Equipment: Provide all motor, starter, controls, associated devices, and interconnecting wiring required for the installation. Equipment and wiring shall be as specified in Division 26, ELECTRICAL.

1.8 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. Builders Hardware Manufacturers Association, Inc. (BHMA):
A156.10-05.....Power Operated Pedestrian Doors (BHMA 1601)

C. National Fire Protection Association (NFPA):
101-09.....Life Safety Code

D. Underwriters Laboratory (UL):
325-10.....Door, Drapery, Gate, Louver, and Window Operators and Systems

1.9 DELIVERY AND STORAGE

A. Delivery shall be in factory’s original, unopened, undamaged container with identification labels attached.

PART 2 - PRODUCTS

2.1 SWING DOOR OPERATORS

A. General: Swing door operators shall be of institutional type, door panel size 600 mm to 1250 mm (2'-0" to 5'-0") width, weight not to exceed 300 kg (600 pounds), electric operated for overhead mounting

within the header or transom. Furnish metal mounting supports, brackets and other accessories necessary for the installation of operators at the head of the door frames. The motor on automatic door operator shall be provided with an interlock so that the motor will not operate when doors are electrically locked from opening.

B. Operators shall have checking mechanism providing cushioning action at last part of door travel, in both opening and closing cycle. Operators shall be capable of recycling doors instantaneously to full open position from any point in the closing cycle when control switch is activated. Operators shall, when automatic power is interrupted or shut-off, permit doors to easily open manually without damage to automatic operator system.

C. Operator, enclosed in housing, shall open door by energizing motor and shall stop by electrically reducing voltage and stalling motor against mechanical stop. Door shall close by means of spring energy, and close force shall be controlled by gear system and motor being used as dynamic break without power, or controlled by hydraulic closer in electro-hydraulic operators. System shall operate as manual door control in event of power failure. Opening and closing speeds shall be adjustable:

1. Operator Housing: Housing shall be a minimum of 112 mm (4-1/2 inches) wide by 140 mm (5.5 inches) high aluminum extrusions with enclosed end caps for application to 100 mm (4 inches) and larger frame systems. All structural sections shall have a minimum thickness of 3.2 mm (0.125 inch) and be fabricated of a minimum of 6063-T5 aluminum alloy.
2. Power Operator: Completely assembled and sealed unit which shall include gear drive transmission, mechanical spring and bearings, all located in aluminum case and filled with special lubricant for extreme temperature conditions. Complete unit shall be rubber mounted with provisions for easy maintenance and replacement, without removing door from pivots or frame.
3. Connecting hardware shall have drive arm attached to door with a pin linkage rotating in a self-lubricating bearing. Door shall not pivot on shaft of operator.
4. Electrical Control: Operator shall have a self contained electrical control unit, including necessary transformers, relays, rectifiers, and other electronic components for proper operation and switching

of power operator. All connecting harnesses shall have interlocking plugs.

2.2 MICROPRCESSOR CONTROLS

A. The system shall include a multi-function microprocessor control providing adjustable hold open time (1–30 seconds), LED indications for sensor input signals and operator status and power assist close options. Control shall be capable of receiving activation signals from any device with normally open dry contact output. All activation modes shall provide fully adjustable opening speed:

B. The door shall be held open by low voltage applied to the continuous duty motor. The control shall include an adjustable safety circuit that monitors door operation and stops the opening direction of the door if an obstruction is sensed. The motor shall include a recycle feature that reopens the door if an obstruction is sensed at any point during the closing cycle. The control shall include a standard three position key switch with functions for ON, OFF, and HOLD OPEN, mounted on operator enclosure, door frame, or wall, as indicated in the architectural drawings.

2.3 POWER UNITS

A. Each power unit shall be self-contained, electric operated and independent of the door operator. Capacity and size of power circuits shall be in accordance with automatic door operator manufacturer's specifications and Division 26 – ELECTRICAL.

2.4 DOOR CONTROLS

A. Opening and closing actions of doors shall be actuated by controls and safety devices specified, and conform to ANSI 156.10. Controls shall cause doors to open instantly when control device is actuated; hold doors in open positions; then, cause doors to close, unless safety device or reactivated control interrupts operation.

B. Manual Controls:

1. Push Plate Wall Switch: Recess type, stainless steel push plate minimum 100 mm by 100 mm (four-inch by four-inch), with 13 mm (l/2-inch) high letters "To Operate Door--Push" engraved on face of plate.

C. Motion Detector: The motion detector may be surface mounted or concealed, to provide a signal to actuate the door operator, and monitor the immediate zone, to detect intrusion by persons, carts or similar objects. The zone which the detector monitors shall be 1500 mm

(five feet) deep and 1500 mm (five feet) across, plus or minus 150 mm (six inches) on all dimensions. The maximum response time shall be no less than 25 milliseconds. Unit shall be designed to operate on 24 volts AC. The control shall not be affected by cleaning material, solvents, dust, dirt and outdoor weather conditions.

D. Card Reader: provided by Government under a separate contract.

2.5 SAFETY DEVICES

A. General: Area over which doors swing or slide shall be a safety section and anyone standing in path of door's movement shall be protected by a safety device.

B. Each swing door shall have installed on the pull side a presence sensor to detect any person standing in the door swing path and prevent the door from opening.

C. Time delay switches shall be adjustable between 3 to 60 seconds and shall control closing cycle of doors.

D. Decals with sign "In" or "Do Not Enter" shall be installed on both faces of each door.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Coordinate installation of equipment with other related work. Manual controls and power disconnect switches shall be recessed or semi-flush mounted in partitions. Secure operator components to adjacent construction with suitable fastenings. Conceal conduits, piping, and electric equipment, in finish work.

B. All equipment, including time delay switches, shall be accessible for maintenance and adjustment.

C. Operators shall be adjusted and must function properly for the type o£ traffic (pedestrians, carts, stretchers and wheelchairs) expected to pass through doors. Each door leaf of pairs of doors shall open and close in synchronization. On pairs of doors, operators shall allow either door to be opened manually without the other door opening.

D. Install controls at positions shown and make them convenient for particular traffic expected to pass through openings. Maximum height of push plate wall switches from finished floors shall be 40 inches unless otherwise approved by the Resident Engineer.

3.2 INSTRUCTIONS

A. Following the installation and final adjustments of the door operators, the installer shall fully instruct VA personnel for 4 hours on the

operating, servicing and safety requirements for the swing automatic door operators.

B. Coordinate instruction to VA personnel with VA Resident Engineer.

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SECTION 08 80 00
GLAZING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies glass, plastic, related glazing materials and accessories. Glazing products specified apply to factory or field glazed items.

1.2 RELATED WORK

A. Factory glazed by manufacturer in following units:
   1. Sound resistant doors: Section 08 11 13, HOLLOW METAL DOORS AND FRAMES, and Section 08 14 00, WOOD DOORS.
   2. Mirrors: Section 10 28 00, TOILET, BATH, AND LAUNDRY ACCESSORIES.
   3. Section 08 51 13, ALUMINUM WINDOWS (Fixed).
   4. Section 08 44 13, GLAZED ALUMINUM CURTAIN WALLS.
   5. Section 08 41 13, ALUMINUM-FRAMED ENTRANCES & STOREFRONTS
   6. Section __ __ __, INTERIOR ALUMINUM & GLASS DOORS & SIDELIGHTS
   7. Color of spandrel glass, Low-E glass: Section 09 06 00, SCHEDULE FOR FINISHES.
   8. Blast Resistant Glazing: Section 08 56 53, BLAST RESISTANT WINDOWS.

1.3 LABELS

A. Temporary labels:
   1. Provide temporary label on each light of glass and plastic material identifying manufacturer or brand and glass type, quality and nominal thickness.
   2. Label in accordance with NFRC (National Fenestration Rating Council) label requirements.
   3. Temporary labels shall remain intact until glass and plastic material is approved by Resident Engineer.

B. Permanent labels:
   1. Locate in corner for each pane.
   2. Label in accordance with ANSI Z97.1 and SGCC (Safety Glass Certification Council) label requirements.
      a. Tempered glass.
      b. Laminated glass or have certificate for panes without permanent label.
      c. Organic coated glass.
   3. Blast resistance glass or plastic assemblies:

a. See Section 08 56 53, BLAST RESISTANT WINDOWS for performance requirements.

b. Identify each security glazing permanently with glazing manufacturer's name, date of manufacture, product number, and DOS Code number inconspicuously located in lower corner on protective side and visible after glazing is framed.

c. The "attack (threat) side" shall be identified in bold lettering on each side of glazing with removable label.

1.4 PERFORMANCE REQUIREMENTS

A. Building Enclosure Vapor Retarder and Air Barrier:

1. Utilize the inner pane of multiple pane sealed units for the continuity of the air barrier and vapor retarder seal.
2. Maintain a continuous air barrier and vapor retarder throughout the glazed assembly from glass pane to heel bead of glazing sealant.

B. Glass Thickness:

1. Select thickness of exterior glass to withstand dead loads and wind loads acting normal to plane of glass at design pressures calculated in accordance with ASCE 7 applicable code.
2. Limit glass deflection to 1/200 or flexure limit of glass, whichever is less, with full recovery of glazing materials.
3. Test in accordance with ASTM E 330.
4. Thicknesses listed are minimum. Coordinate thicknesses with framing system manufacturers.

C. Blast resistance glass or plastic assemblies: See Section 08 56 53, BLAST RESISTANT WINDOWS for performance requirements.

1.5 SUBMITTALS

A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Certificates:

1. Certificates stating that wire glass, meets requirements for safety glazing material as specified in ANSI Z97.1.
2. Certificate on shading coefficient.
3. Certificate on "R" value when value is specified.
4. Certificate test reports confirming compliance’s with specified bullet resistive rating.
5. Certificate that blast resistant glass meets the requirements of UFC4-010-01.

C. Warranty: Submit written guaranty, conforming to General Condition requirements, and to “Warranty of Construction” Article in this Section.

D. Manufacturer's Literature and Data:
   1. Glass, each kind required.
   2. Insulating glass units.
   3. Transparent (one-way vision glass) mirrors.
   4. Elastic compound for metal sash glazing.
   5. Putty, for wood sash glazing.
   6. Glazing cushion.
   7. Sealing compound.
   8. Bullet resistive material.
   9. Plastic glazing material, each type required.

E. Samples:
   1. Size: 150 mm by 150 mm (6 inches by 6 inches).
   2. Low-E glass.
   3. Spandrel glass.

F. Preconstruction Adhesion and Compatibility Test Report: Submit glazing sealant manufacturer’s test report indicating glazing sealants were tested for adhesion to glass and glazing channel substrates and for compatibility with glass and other glazing materials.

G. LEED Information:
   1. LEED Credit MR 4.1 and MR 4.2, Recycled Content: Product data indicting percentages, by weight of post-consumer and post-industrial recycled content for products having recycled content.
      a. Include statement indicating costs for each product having recycled content.
   2. LEED Credit MR 5.1 and MR 5.2, Materials Extracted, Processed and Manufactured Regionally: Manufacturer’s data identifying point of origin for products procured within a 500 mile radius of the project.
      a. Include statement indicating costs for each product submitted.

1.6 DELIVERY, STORAGE AND HANDLING

A. Delivery: Schedule delivery to coincide with glazing schedules so minimum handling of crates is required. Do not open crates except as required for inspection for shipping damage.

B. Storage: Store cases according to printed instructions on case, in areas least subject to traffic or falling objects. Keep storage area clean and dry.

C. Handling: Unpack cases following printed instructions on case. Stack individual windows on edge leaned slightly against upright supports with separators between each.

D. Protect laminated security glazing units against face and edge damage during entire sequence of fabrication, handling, and delivery to installation location. Provide protective covering on exposed faces of glazing plastics, and mark inside as "INTERIOR FACE" or "PROTECTED FACE":

1. Treat security glazing as fragile merchandise, and packaged and shipped in export wood cases with width end in upright position and blocked together in a mass. Storage and handling shall comply with Manufacturer's directions and as required to prevent edge damage or other damage to glazing resulting from effects of moisture, condensation, temperature changes, direct exposure to sun, other environmental conditions, and contact with chemical solvents.
2. Protect sealed-air-space insulating glazing units from exposure to abnormal pressure changes, as could result from substantial changes in altitude during delivery by air freight. Provide temporary breather tubes which do not nullify applicable warranties on hermetic seals.
3. Temporary protections: The glass front and polycarbonate/Noviflex back of glazing shall be temporarily protected with compatible, peelable, heat-resistant film which will be peeled for inspections and re-applied and finally removed after doors and windows are installed at destination. Since many adhesives will attack polycarbonate, the film used on exposed polycarbonate surfaces shall be approved and applied by manufacturer.
4. Edge protection: To cushion and protect glass clad, polycarbonate, and Noviflex edges from contamination or foreign matter, the four edges shall be sealed the depth of glazing with continuous standard-thickness Santoprene tape. Alternatively, continuous channel shaped extrusion of Santoprene shall be used, with flanges extending into face sides of glazing.
5. Protect "Constant Temperature" units including every unit where glass sheet is directly laminated to or directly sealed with metal-

tube type spacer bar to polycarbonate sheet, from exposures to ambient temperatures outside the range of 16 to 24 C, during the fabricating, handling, shipping, storing, installation, and subsequent protection of glazing.

1.7 PROJECT CONDITIONS

A. Field Measurements: Field measure openings before ordering tempered glass products. Be responsible for proper fit of field measured products.

1.8 WARRANTY

A. Warranty: Conform to terms of "Warranty of Construction", FAR clause 52.246-21, except extend warranty period for the following:
   1. Blast resistive plastic material to remain visibly clear without discoloration for 10 years.
   2. Insulating glass units to remain sealed for 10 years.
   3. Laminated glass units to remain laminated for 5 years.
   4. Polycarbonate to remain clear and ultraviolet light stabilized for 5 years.

1.9 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.

B. American National Standards Institute (ANSI):

Z97.1-04.....Safety Glazing Material Used in Building - Safety Performance Specifications and Methods of Test.

C. American Society for Testing and Materials (ASTM):

C1363-05.....Thermal Performance of Building Assemblies, by Means of A Hot Box Apparatus

C542-05.....Lock-Strip Gaskets.

C716-06.....Installing Lock-Strip Gaskets and Infill Glazing Materials.

C864-05.....Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.

C920-05.....Elastomeric Joint Sealants.

C1036-06.....Flat Glass.

C1048-04.....Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass.

C1172-03.....Laminated Architectural Flat Glass.

C1349-04.....Architectural Flat Glass Clad Polycarbonate.
D635-06.....Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastic in a Horizontal Position.
D4802-07.....Poly (Methyl Methacrylate) Acrylic Plastic Sheet.
E84-01.....Surface Burning Characteristics of Building Materials.
E330-02.....Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
E774-97.....Sealed Insulating Glass Units

D. Commercial Item Description (CID):
A-A-59502.....Plastic Sheet, Polycarbonate

E. Code of Federal Regulations (CFR):
16 CFR 1201 - Safety Standard for Architectural Glazing Materials; 1977, with 1984 Revision.

F. National Fire Protection Association (NFPA):
80-06.....Fire Doors and Windows.

G. National Fenestration Rating Council (NFRC):
Certified Products Directory (Latest Edition).

H. Safety Glazing Certification Council (SGCC):
Certified Products Directory (Issued Semi-Annually).

I. Underwriters Laboratories, Inc. (UL):
752-05.....Bullet-Resisting Equipment.

J. Unified Facilities Criteria (UFC):
4-010-01-2007.....DOD Minimum Antiterrorism Standards for Buildings

PART 2 - PRODUCT

2.1 GLASS

A. Use thickness stated unless specified otherwise in assemblies.

B. Clear Glass:
1. ASTM C1036, Type I, Class 1, Quality q3.
2. Thickness, 6 mm (1/4 inch) or as indicated.

2.2 HEAT-TREATED GLASS

A. Clear Heat Strengthened Glass:
1. ASTM C1048, Kind HS, Condition A, Type I, Class 1, Quality q3.
2. Thickness, 6 mm (1/4 inch) or as indicated.

B. Clear Tempered Glass:
   1. ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality q3.
   2. Thickness, 6 mm (1/4 inch) or as indicated.
   3. **GL-7**

2.3 COATED GLASS

A. Spandrel Glass:
   1. ASTM C1048, Kind HS, Condition B, Type I.
   2. Apply coating to second surface of insulating glass units.
   3. Thickness, 6 mm (1/4 inch) or as indicated.

B. Low-E Tempered Glass:
   1. ASTM C1048, Kind FT, Condition C, Type I, Class 1, Quality q3 with low emissivity sputter coating having an E of 0.15.
   2. Apply coating to second surface of insulating glass units.
   3. Thickness, 6 mm (1/4 inch) or as indicated.

C. Low-E Heat Strengthened Glass:
   1. ASTM C1048, Kind HS, Condition C, Type I, Class 1, Quality q3 with low emissivity sputter coating having an E of 0.15.
   2. Apply coating to second surface of insulating glass units.
   3. Thickness, 6 mm (1/4 inch) or as indicated.

2.4 PLASTIC

A. Clear Polycarbonate Sheet, Abrasion Resistant:
   1. Fed. Spec. A-A-59502, Type III, coated mar resistant, Class 1, ultraviolet light stabilized, Grade A, High abrasion resistance. Flame spread of 10 or less when tested per ASTM E84.
   2. Thickness, as indicated.

2.5 LAMINATED GLASS

A. Interlayer between glass panes: ASTM C 1172. Use heat and light stable polyvinyl butyral (PVB) plasticized resin sheeting.

B. Clear PVB:
   1. Use clear PVB having heat and ultraviolet light color stabilization.

C. Use 1.5 mm (0.060 inch) thick PVB for:
   1. Horizontal or Sloped glazing.
   2. Acoustical glazing.

D. Use 0.75 mm (0.030 inch) thick PVB for vertical glazing where 1.5 mm (0.060 inch) PVB is not otherwise indicated or required.

E. Decorative Glass: Laminated glass, ASTM C 1172. Use materials that have a proven record of not bubbling, discoloring, or losing physical and mechanical properties after fabrication and installation.

1. Basis-of-Design product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   a. Joel Berman Glass Studios International Ltd., Merchandise Mart Plaza Suite 1173, Chicago, IL 60654.
      1) Texture: Atlantis.
      2) Pattern: Basic organic design.
2. Construction: Cast glass.
3. Thickness of each glass ply: 3/8 inch (+/- 1/8 inch) panels.
4. Construction: Cast glass (molded).
5. Comply with requirements for safety glazing.
6. Pattern: See above.
7. **GL-6**

2.6 LAMINATED GLAZING ASSEMBLIES

A. Clear Heat Strengthened Glazing:
   1. Both panes, ASTM C1048, Kind HS, Condition A, Type I, Class 1, Quality q3.
   2. Thickness: Each pane, 4.8 mm (3/16 inch) thick or as indicated.

2.7 INSULATING GLASS UNITS

A. Provide factory fabricated, hermetically sealed glass unit consisting of two panes of glass separated by a dehydrated air space.
B. Assemble units using glass types specified.
C. Sealed Edge Units (SEU):
   1. Conform to ASTM E774, Class C performance requirements.
   2. Air Space not less than 13 mm (½ inch) wide.
   3. R value not less than 1.65.
D. SEU Clear Glass:
   1. Exterior pane ASTM C1048, Kind HS, Condition A, Type I, Class 1, Quality q3, Low-E coating on second surface, 6 mm (1/4 inch) thick.
   2. Interior pane ASTM C1048, Kind HS, Condition A, Type I, Class 1, Quality q3, 6 mm (1/4 inch) thick.
   3. **GL-4**
E. SEU Clear Tempered Glass and Laminated Glass for blast resistant glazing condition:
   1. Exterior pane ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality q3, low-E coating on second surface 6 mm (1/4 inch) thick.

2. Interior pane laminated of ASTM C1048, Kind HS, Condition A, Type I, Class 1, Quality q3. Thickness: Each pane 4.8 mm (3/16 inch) thick as indicated.
3. **GL-3**

F. SEU Clear Heat Strengthened and Laminated Glass for blast resistant glazing condition.
1. Exterior Pane ASTM C1048, Kind HS, Condition A, Type I, Class 1, Quality q3, Low-E coating on second surface, 6 mm (1/4 inch) thickness.
2. Interior pane laminated of ASTM C1048, Kind HS, Condition A, Type I, Class 1, Quality q3. Thickness: Each pane 4.8 mm (3/16 inch) thick as indicated.
3. **GL-1**

G. SEU Clear Heat Strengthened and Laminated Glass for blast resistant glazing spandrel condition.
1. Exterior Pane ASTM C1048, Kind HS, Condition A, Type I, Class 1, Quality q3, 6 mm (1/4 inch) thickness. Spandrel coating on surface two.
2. Interior pane laminated of ASTM C1048, Kind HS, Condition A, Type I, Class 1, Quality q3. Thickness: Each pane 4.8 mm (3/16 inch) as indicated.
3. **GL-2**

2.8 FIRE RESISTANT GLASS WITHOUT WIRE MESH

A. Fire resistant glass or glass assembly classified by UL in Building Materials Directory or other approved testing laboratory bearing permanent mark of classification.

B. Firelite.
1. UL listing R13377-1, 4.8 mm (3/16 inch) thick, unpolished.
2. Distributed by Technical Glass Products; Kirkland, WA 98033.

C. Refer to Door Schedule and Window Lite Types for location(s).
1. Interior fire rated doors.
2. Other fire rated assemblies.

D. **GL-5**

2.9 GLAZING ACCESSORIES

A. As required to supplement the accessories provided with the items to be glazed and to provide a complete installation. Ferrous metal accessories exposed in the finished work shall have a finish that will not corrode or stain while in service.

B. Setting Blocks: ASTM C864:
   1. Channel shape; having 6 mm (1/4 inch) internal depth.
   2. Shore a hardness of 80 to 90 Durometer.
   3. Block lengths: 50 mm (two inches) except 100 to 150 mm (four to six inches) for insulating glass.
   4. Block width: Approximately 1.6 mm (1/16 inch) less than the full width of the rabbet.
   5. Block thickness: Minimum 4.8 mm (3/16 inch). Thickness sized for rabbet depth as required.

C. Spacers: ASTM C864:
   1. Channel shape having a 6 mm (1/4 inch) internal depth.
   2. Flanges not less 2.4 mm (3/32 inch) thick and web 3 mm (1/8 inch) thick.
   3. Lengths: One to 25 to 76 mm (one to three inches).
   4. Shore a hardness of 40 to 50 Durometer.

D. Sealing Tapes:
   1. Semi-solid polymeric based material exhibiting pressure-sensitive adhesion and withstanding exposure to sunlight, moisture, heat, cold, and aging.
   2. Shape, size and degree of softness and strength suitable for use in glazing application to prevent water infiltration.

E. Spring Steel Spacer: Galvanized steel wire or strip designed to position glazing in channel or rabbeted sash with stops.

F. Glazing Gaskets: ASTM C864:
   1. Firm dense wedge shape for locking in sash.
   2. Soft, closed cell with locking key for sash key.
   3. Flanges may terminate above the glazing-beads or terminate flush with top of beads.

G. Lock-Strip Glazing Gaskets: ASTM C542, shape, size, and mounting as indicated.

H. Glazing Sealants: ASTM C920, silicone neutral cure:
   1. Type S.
   2. Class 25
   3. Grade NS.
   4. Shore A hardness of 25 to 30 Durometer.

I. Structural Sealant: ASTM C920, silicone acetoxy cure:
   1. Type S.
   2. Class 25.

3. Grade NS.
4. Shore a hardness of 25 to 30 Durometer.

J. Neoprene, EPDM, or Vinyl Glazing Gasket: ASTM C864.
1. Channel shape; flanges may terminate above the glazing channel or flush with the top of the channel.
2. Designed for dry glazing.

K. Color:
1. Color of glazing compounds, gaskets, and sealants used for aluminum color frames shall match color of the finished aluminum and be nonstaining.
2. Color of other glazing compounds, gaskets, and sealants which will be exposed in the finished work and unpainted shall be black, gray, or neutral color.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:
1. Examine openings for glass and glazing units; determine they are proper size; plumb; square; and level before installation is started.
2. Verify that glazing openings conform with details, dimensions and tolerances indicated on manufacturer’s approved shop drawings.

B. Advise Contractor of conditions which may adversely affect glass and glazing unit installation, prior to commencement of installation: Do not proceed with installation until unsatisfactory conditions have been corrected.

C. Verify that wash down of adjacent masonry is completed prior to erection of glass and glazing units to prevent damage to glass and glazing units by cleaning materials.

3.2 PREPARATION

A. For sealant glazing, prepare glazing surfaces in accordance with GANA-02 Sealant Manual.

B. Determine glazing unit size and edge clearances by measuring the actual unit to receive the glazing.

C. Shop fabricate and cut glass with smooth, straight edges of full size required by openings to provide GANA recommended edge clearances.

D. Verify that components used are compatible.

E. Clean and dry glazing surfaces.

F. Prime surfaces scheduled to receive sealants, as determined by preconstruction sealant-substrate testing.

3.3 INSTALLATION - GENERAL

A. Install in accordance with GANA-01 Glazing Manual and GANA-02 Sealant Manual unless specified otherwise.

B. Glaze in accordance with recommendations of glazing and framing manufacturers, and as required to meet the Performance Test Requirements specified in other applicable sections of specifications.

C. Set glazing without bending, twisting, or forcing of units.

D. Do not allow glass to rest on or contact any framing member.

E. Glaze doors in a securely fixed or closed and locked position, until sealant, glazing compound, or putty has thoroughly set.

F. Tempered Glass: Install with roller distortions in horizontal position unless otherwise directed.

G. Laminated Glass:

1. Tape edges to seal interlayer and protect from glazing sealants.
2. Do not use putty or glazing compounds.

H. Insulating Glass Units:

1. Glaze in compliance with glass manufacturer's written instructions.
2. When glazing gaskets are used, they shall be of sufficient size and depth to cover glass seal or metal channel frame completely.
3. Do not use putty or glazing compounds.
4. Do not grind, nip, cut, or otherwise alter edges and corners of fused glass units after shipping from factory.
5. Install with tape or gunnable sealant in wood sash.

I. Fire Resistant Glass:

1. Other fire resistant glass: Glaze in accordance with UL design requirements.

3.4 INSTALLATION - DRY METHOD (TAPE AND GASKET SPLINE GLAZING)

A. Cut glazing tape spline to length; install on glazing pane. Seal corners by butting and sealing junctions with butyl sealant.

B. Place setting blocks at 1/4 points with edge block no more than 150 mm (6 inches) from corners.

C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.

D. Install removable stops without displacing glazing spline. Exert pressure for full continuous contact.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Trim protruding tape edge.

3.5 INSTALLATION - WET/DRY METHOD (PREFORMED TAPE AND SEALANT)

A. Cut glazing tape to length and set against permanent stops, 5 mm (3/16 inch) below sight line. Seal corners by butting tape and dabbing with butyl sealant.

B. Apply heel bead of butyl sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete the continuity of the air and vapor seal.

C. Place setting blocks at 1/4 points with edge block no more than 150 mm (6 inches) from corners.

D. Rest glazing on setting blocks and push against tape and heel bead of sealant with sufficient pressure to achieve full contact at perimeter of pane or glass unit.

E. Install removable stops, with spacer strips inserted between glazing and applied stops, 6 mm (1/4 inch) below sight line. Place glazing tape on glazing pane or unit with tape flush with sight line.

F. Fill gap between glazing and stop with manufacturers recommended type sealant to depth equal to bite of frame on glazing, but not more than 9 mm (3/8 inch) below sight line.

G. Apply cap bead of manufacturers recommended type sealant along void between the stop and the glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.6 INSTALLATION - WET METHOD (SEALANT AND SEALANT)

A. Place setting blocks at 1/4 points and install glazing pane or unit.

B. Install removable stops with glazing centered in space by inserting spacer shims both sides at 600 mm (24 inch) intervals, 6 mm (1/4 inch) below sight line.

C. Fill gaps between glazing and stops with manufacturers recommended type sealant to depth of bite on glazing, but not more than 9 mm (3/8 inch) below sight line to ensure full contact with glazing and continue the air and vapor seal.

D. Apply sealant to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.7 INSTALLATION - INTERIOR WET/DRY METHOD (TAPE AND SEALANT)

A. Cut glazing tape to length and install against permanent stops, projecting 1.6 mm (1/16 inch) above sight line.

B. Place setting blocks at 1/4 points with edge block no more than 150 mm (6 inches) from corners.

C. Rest glazing on setting blocks and push against tape to ensure full contact at perimeter of pane or unit.

D. Install removable stops, spacer shims inserted between glazing and applied stops at 600 mm (24 inch) intervals, 6 mm (1/4 inch) below sight line.

E. Fill gaps between pane and applied stop with manufacturers recommended type sealant to depth equal to bite on glazing, to uniform and level line.

F. Trim protruding tape edge.

3.8 INSTALLATION - INTERIOR WET METHOD (COMPOUND AND COMPOUND)

A. Install glazing resting on setting blocks. Install applied stop and center pane by use of spacer shims at 600 mm (24 inch) centers, kept 6 mm (1/4 inch) below sight line.

B. Locate and secure glazing pane using glazers' or spring wire clips.

C. Fill gaps between glazing and stops with glazing compound until flush with sight line. Tool surface to straight line.

3.9 REPLACEMENT AND CLEANING

A. Clean new glass surfaces removing temporary labels, paint spots, and defacement after approval by Resident Engineer.

B. Replace cracked, broken, and imperfect glass, or glass which has been installed improperly.

C. Leave glass, putty, and other setting material in clean, whole, and acceptable condition.

3.10 PROTECTION

A. Protect finished surfaces from damage during erection, and after completion of work. Strippable plastic coatings on colored anodized finish are not acceptable.

3.11 GLAZING SCHEDULE

A. Fire Resistant Glass:

1. Refer to Door and Window schedules for use of Fire Resistant Glass without wire mesh.

B. Tempered Glass:

1. Install in full and half glazed interior doors unless indicated otherwise.
2. Use SEU Low-E tempered glass in exterior pane and clear laminated glass in interior pane unless specified otherwise of insulating

glass units in exterior doors, adjacent to door, within 18 inches of a walking surface, or within 60 inches of a stair landing..

C. Clear Glass:

1. Interior pane of dual glazed windows not receiving tempered, laminated or other special glass indicated or specified.

D. Insulating Glass:

1. Install SEU Low-E tempered glass in windows, exterior pane of dual glazed windows, storefronts, curtain walls, adjacent to entrances or walks.
2. Install SEU Low-E heat strengthened glass in windows, exterior pane of dual glazed windows, and curtain walls not adjacent to entrances or walks.
3. Install SEU clear heat strengthened laminated glass, interior pane of dual glazed windows.

F. Laminated Glass: Install as specified in doors and interior pane of dual glazed windows where indicated.

1. If laminated glass is required for double glazed windows, provide it for interior panes only.
2. Where laminated glass is required for blast-resistant windows, follow UFC4-010-01, DOD Minimum Antiterrorism Standards for Buildings.

G. Spandrel Glass: Install specified spandrel glazing where indicated.

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SECTION 08 90 00
LOUVERS AND VENTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies fixed and operable wall louvers, door louvers and wall vents.

1.2 RELATED WORK

A. Color of finish: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings:
Each type, showing material, finish, size of members, operating devices, method of assembly, and installation and anchorage details.

C. Manufacturer's Literature and Data:
Each type of louver and vent.

D. LEED Information:
1. LEED Credit MR 4.1 and MR 4.2, Recycled Content: Product data indicting percentages, by weight of post-consumer and post-industrial recycled content for products having recycled content.
   a. Include statement indicating costs for each product having recycled content.
2. LEED Credit MR 5.1 and MR 5.2, Materials Extracted, Processed and Manufactured Regionally: Manufacturer’s data identifying point of origin for products procured within a 500 mile radius of the project.
   a. Include statement indicating costs for each product submitted.

1.4 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. The Master Painters Institute (MPI):
Approved Product List – November 2007

C. American Society for Testing and Materials (ASTM):
A167-99(R2004).....Stainless and Heat-Resisting Chromium - Nickel Steel Plate, Sheet, and Strip
A1008/A1008M REV A-07...Steel, Sheet, Carbon, Cold Rolled, Structural, and High Strength Low-Alloy with Improved Formability
B209/B209M-07.....Aluminum and Aluminum Alloy, Sheet and Plate

B221-06.....Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

B221M-07.....Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire Shapes, and Tubes

D. National Association of Architectural Metal Manufacturers (NAAMM):
AMP 500-505 (1988).....Metal Finishes Manual

E. National Fire Protection Association (NFPA):
90A-02.....Installation of Air Conditioning and Ventilating Systems

F. American Architectural Manufacturers Association (AAMA):
605-98.....High Performance Organic Coatings on Architectural Extrusions and Panels

G. Air Movement and Control Association, Inc. (AMCA):
500-L-99.....Testing Louvers

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum, Extruded: ASTM B221/B221M.

B. Aluminum, Plate and Sheet: ASTM B209/B209M.

C. Fasteners: Fasteners for securing louvers and wall vents to adjoining construction, except as otherwise specified or shown, shall be toggle or expansion bolts, of size and type as required for each specific type of installation and service condition.

1. Where type, size, or spacing of fasteners is not shown or specified, submit shop drawings showing proposed fasteners, and method of installation.
2. Fasteners for louvers, louver frames, and wire guards shall be of stainless steel or aluminum.

2.2 EXTERIOR WALL LOUVERS

A. Basis of Design Product: Subject to compliance with requirements, provide Construction Specialties, Inc., (C/S Group); C/S 7" deep storm resistant fixed horizontal louver, Model RS-7315 or comparable product conforming to the Design & Performance Requirements of this specification.

B. General:

1. Provide fixed type louvers of size and design shown.
2. Heads, sills and jamb sections shall have formed caulking slots or be designed to retain caulking. Head sections shall have exterior drip lip, and sill sections an integral water stop.
3. Furnish louvers with sill extension or separate sill as shown.

4. Frame shall be mechanically fastened or welded construction with welds dressed smooth and flush.

C. Performance Characteristics:
1. Weather louvers shall have a minimum of 50 percent free area and shall pass 1000 mm/s (fpm) free area velocity at a pressure drop not exceeding 0.15 mm (inch) water gage and carry not more than 0.01 g (ounces) of water per m² (square foot) of free area for 15 minutes when tested per AMCA Standard 500-L.
2. Louvers shall bear AMCA certified rating seals for air performance and water penetration ratings.

D. Aluminum Louvers:
1. General: Frames, blades, sills and mullions (sliding interlocking type); 2 mm (0.081-inch) thick extruded aluminum. Blades shall be or drainable type and have reinforcing bosses.
2. Louvers, fixed: Make frame sizes 13 mm (1/2-inch) smaller than openings. Single louvers frames shall not exceed 1700 mm (66 inches) wide. When openings exceed 1700 mm (66 inches), provide twin louvers separated by mullion members.

2.3 CLOSURE ANGLES AND CLOSURE PLATES

A. Fabricate from 2 mm (0.074-inch) thick stainless steel or aluminum.
B. Provide continuous closure angles and closure plates on inside head, jambs and sill of exterior wall louvers.
C. Secure angles and plates to louver frames with screws, and to masonry or concrete with fasteners as specified.

2.4 WIRE GUARDS

A. Provide wire guards on outside of all exterior louvers, except on exhaust air louvers.
B. Fabricate frames from 2 mm (0.081-inch) thick extruded or sheet aluminum designed to retain wire mesh.
C. Wire mesh shall be woven from not less than 1.6 mm (0.063-inch) diameter aluminum wire in 13 mm (1/2-inch) square mesh.
D. Miter corners and join by concealed corner clips or locks extending about 57 mm (2-1/4 inches) into rails and stiles. Equip wire guards over four feet in height with a mid-rail constructed as specified for frame components.
E. Fasten frames to outside of louvers with aluminum or stainless steel devices designed to allow removal and replacement without damage to the wire guard or the louver.

2.5 FINISH

A. In accordance with NAAMM Metal Finishes Manual: AMP 500-505.

B. Aluminum Louvers Wire Guards:

1. Color Anodic Finish: AAMA 611 (AA-M12C22 A 42/A44 Class I, 0.018 mm).

2.6 PROTECTION

A. Provide protection for aluminum against galvanic action wherever dissimilar materials are in contact, by painting the contact surfaces of the dissimilar material with a heavy coat of bituminous paint (complete coverage), or by separating the contact surfaces with a performed synthetic rubber tape having pressure sensitive adhesive coating on one side.

B. Isolate the aluminum from plaster, concrete and masonry by coating aluminum with zinc-chromate primer.

C. Protect finished surfaces from damage during fabrication, erection, and after completion of the work.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Set work accurately, in alignment and where shown. Items shall be plumb, level, free of rack and twist, and set parallel or perpendicular as required to line and plane of surface.

B. Furnish setting drawings and instructions for installation of anchors and for the positioning of items having anchors to be built into masonry construction. Provide temporary bracing for such items until masonry is set.

C. Provide anchoring devices and fasteners as shown and as necessary for securing louvers to building construction as specified. Power actuated drive pins may be used, except for removal items and where members would be deformed or substrate damaged by their use.

3.2 CLEANING AND ADJUSTING

A. After installation, all exposed prefinished and plated items and all items fabricated from stainless steel and aluminum shall be cleaned as recommended by the manufacturer and protected from damage until completion of the project.

B. All movable parts, including hardware, shall be cleaned and adjusted to operate as designed without binding or deformation of the members, so as to be centered in the opening of frame, and where applicable, to have all contact surfaces fit tight and even without forcing or warping the components

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SECTION 08 92 00
EQUIPMENT SCREENS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies fixed aluminum blade type screens for roof top equipment.

1.2 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings:
Each type, showing material, finish, size of members, method of assembly, and installation and anchorage details.

C. Manufacturer's Literature and Data:
Equipment screen.

1.3 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. American Society for Testing and Materials (ASTM):
A167-99(R2004).....Stainless and Heat-Resisting Chromium - Nickel Steel Plate, Sheet, and Strip
B209/B209M-07.....Aluminum and Aluminum Alloy, Sheet and Plate
B221-06.....Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
B221M-07.....Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire Shapes, and Tubes

C. National Association of Architectural Metal Manufacturers (NAAMM):
AMP 500-505 (1988)......Metal Finishes Manual

D. American Architectural Manufacturers Association (AAMA):
605-98.....High Performance Organic Coatings on Architectural Extrusions and Panels

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum, Extruded: ASTM B221/B221M, Alloy 6063-T52.

B. Stainless Steel: ASTM A167, Type 302B.

C. Aluminum, Plate and Sheet: ASTM B209/B209M.

D. Fasteners: Fasteners for securing screens to adjoining construction, except as otherwise specified or shown, shall be structural aluminum dip

angles and toggle or expansion bolts, of size and type as required for each specific type of installation and service condition.

1. Where type, size, or spacing of fasteners is not shown or specified, submit shop drawings showing proposed fasteners, and method of installation.
2. Fasteners shall be of stainless steel or aluminum.

2.2 EXTERIOR WALL LOUVERS

A. General:

1. Provide fixed type extruded aluminum blades of design shown, minimum 0.81 inch thick, nominally 4 inches deep and spaced approximately 6-3/4 inches on center.
2. Blades shall be supported and lined-up with heavy gauge extruded aluminum braces positively interlocked to each blade and mechanically secured to extruded aluminum supports.

2.3 FINISH

A. In accordance with NAAMM Metal Finishes Manual: AMP 500-505.

B. Aluminum Surfaces: Color Anodic Finish: AAMA 611 (AA-M12C22 A 42/A44 Class I, 0.018 mm).

2.4 PROTECTION

A. Provide protection for aluminum against galvanic action wherever dissimilar materials are in contact, by painting the contact surfaces of the dissimilar material with a heavy coat of bituminous paint (complete coverage), or by separating the contact surfaces with a performed synthetic rubber tape having pressure sensitive adhesive coating on one side.

B. Isolate the aluminum from concrete and masonry by coating aluminum with zinc-chromate primer.

C. Protect finished surfaces from damage during fabrication, erection, and after completion of the work. Strippable plastic coating on organic finish is not approved.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Set work accurately, in alignment and where shown. Items shall be plumb, level, free of rack and twist, and set parallel or perpendicular as required to line and plane of surface.

B. Furnish setting drawings and instructions for installation of anchors and for the positioning of items having anchors to be built into masonry construction. Provide temporary bracing for such items until masonry is set.

C. Provide anchoring devices and fasteners as shown and as necessary for securing screens to building construction as specified. Power actuated drive pins may be used, except where members would be deformed or substrate damaged by their use.

D. Generally, set screens in masonry walls during progress of the work. If wall screens are not delivered to job in time for installation, make provision for later installation.

3.2 CLEANING AND ADJUSTING

A. After installation, all exposed items fabricated from stainless steel and aluminum shall be cleaned as recommended by the manufacturer and protected from damage until completion of the project.

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